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EDITORS

# Machinery for Rehabilitation

PLEDGED FOR REHABILITATION of plant and equipment in continental United States—more than $126,000,000. This is the latest report from the headquarters of the National Committee for Industrial Rehabilitation, the group charged with the responsibility of organizing rehabilitation work in America. It is a good start, but probably this sum represents only a fraction of the equipment replacement and modernization that is going on throughout the industrial world. Even in such bad times as these we have been having manufacturing continues and machines wear out or are retired in favor of better ones. Most managers take replacement as a matter of course and their actions do not get into the record.

AS 1933 GETS INTO ITS STRIDE more and more industrial executives are going to find that their facilities are not adequate to handle the load that will be placed upon them as the tide of industry slowly rises. They will find that the practice of borrowing parts from an idle machine to keep the active ones moving has made many a potentially productive unit permanently or temporarily useless. Those who have thought it better policy to forego replacements of any sort until "things get better" will discover that they simply cannot compete on a price basis with competitors who have followed a more farsighted policy, and who are provided with the best there is in manufacturing equipment.

THESE PROGRESSIVE INDIVIDUALS have always kept themselves informed of the latest achievements of the equipment builders, and they have bought where and when they could. Even so they will find in this review of the new metal-working equipment announced during the last half of 1932 a means of checking their information and of jogging their mental reservations to look into this or that development when the psychological moment finally arrives. How soon that psychological moment will arrive is anybody's guess, but we have an idea that it is not far off.

THOSE FEW WHO HAVE BEEN HIBERNATING will find a surprising picture of courageous initiative in this review of new equipment. They will discover that the great majority of the equipment people have gone steadfastly ahead with their development of new machines and devices to relieve mankind of drudgery, and to improve the quality of the things men use and need and enjoy. They will do well to take as an example this spirit of confidence in the future of our civilization and in the ultimate soundness of our institutions, despite discouraging dislocations, and to emulate it so far as they are able.

IN THE FOLLOWING PAGES they will find the machines they need to restore the disturbed balance of their production equipment facilities. Machines they must have, because the human race has reached a stage where machinery is vital to existence, and because no metal-working plant can continue very long on a profit-making basis if its machines are inadequate.

# Salability and the Shop

**JOHN HAYDOCK**
*Associate Editor, American Machinist*

**Shop executives and designing engineers are becoming more and more dependent on each others' achievements. Today's products must be developed with an eye to modern manufacturing methods; manufacturing methods must advance to meet demands created by these new products**

EVERY so often a new product is placed on the market and gets a spontaneous reception. It is something that people want, and this want is evidenced by their willingness to buy.

The product may be in the consumer goods class—a radio, a household washing machine or a mechanical refrigerator. Or it may be in the capital goods class—a heat-treating furnace, a traveling crane or a machine tool. Whatever it is, the product has an appeal that creates orders.

It has been conclusively demonstrated that such an appeal can surmount even the handicap of adverse business conditions. Apparently some things are designed to be bought.

We may envy the manufacturer whose organization has been lucky enough to conceive this customer-getting product. But better still let us examine some of the methods he has used to achieve this success. Perhaps it is not luck after all.

In order that the reader may not be over-sanguine regarding this analysis, the exposure of a magic formula for producing sure-fire salability is hereby disclaimed. The qualities needed to achieve this result are not reducible to mathematical equations. They include such intangibles as imagination, creative application of theory and perhaps a sixth sense to foretell what the market will accept. Despite the importance of these elusive qualities, a systematic approach to development problems is essential if all factors are to be properly evaluated.

Product development may be roughly divided into three major classifications. One class depends on new elements of design; a second rests on the selection and application of new parts and materials; a third concerns the full utilization of modern manufacturing facilities.

In practice these divisions are seldom distinct but are blurred by the merging of one into the other. When a designer has worked out a new and better combination of machine components, he will naturally consider the availability of advances in manufacturing technique and improvement in materials. In most instances, his finished product will include all three classes of development, styled if possible to capture the sales appeal that leads to profits.

To make another rough classification, we may break down the quality of sales appeal into price, utility and appearance. Incidentally it often happens that these last two are mutually dependent. A product that has utility built into it is usually inherently pleasing to the eye; conversely, a well balanced appearance is a good indication of serviceability.

Some important information on these three properties is disclosed in a survey on product development which was reported in the November number of *Product Engineering*. This survey shows first that, despite adverse conditions, manufacturing concerns are thoroughly sold on the necessity of continued development activity. Of 430 firms reporting, 98 are planning increased development programs while none report in favor of decreases. It is evident therefore that, in the field of product development at least, the turn has been passed.

The survey shows that the designer today is conscious, more so than ever before, of the new materials and modern methods of manufacture that have become available to carry out his ideas. Furthermore, he is eager to employ these facilities to meet the highly competitive conditions now existing in every industry.

Let us look at some of the figures which appeared in the *Product Engineering* report. Out of 430 companies, 330 are engaged in the development of new products in their present line. Of the developments 221 are to reduce the cost of manufacturing, 154 are to increase the number of styles, and 189 are designed to extend the range of operation or use of the product. Here we have our three basic factors: cost, utility and appearance.

The objective, "Reduced Cost of Manufacturing," may be undertaken in a number of ways. It may be accomplished by simplification or standardization of parts or a rearrangement that would decrease the time consumed in their assembly. In this way manufacturing costs might be lowered without any change in the shop methods employed.

But if the designer does not go further than this he is obviously missing a major opportunity. Simplification of design alone, desirable though it may be, may achieve only a fraction of the economies possible through the adoption of modern methods of manufacture. The use of welded construction or improved machining operations might effect savings that would entirely overshadow those possible through changed dimensions or arrangement alone.

This does not mean merely that the designer should develop a product and then seek the best means available for its manufacture. He should design with advances in shop technique ever before him in order to take the fullest advantage of new processes.

An example may serve to emphasize this point. The Longren airplane was designed originally so that machine work could be substituted for hand work in the fabrication of its wings and fuselage. This necessitated a series of experiments that uncovered some heretofore unknown information on the drawing and forming of duralumin.

Wing ribs are made in three sections, each of which is stamped from sheet dural, using punches and dies. A single dural sheet, the length of a full half panel of the wing, is formed to the correct curvature for the leading edge.

In making the fuselage, forms were built of heavy laminations of hardwood covered with steel sheathing to the shape desired for each of the fourteen sections required. These are used with forming machines in a novel manner to bulge each sheet to a curvature in two planes.

The dural is worked cold within four minutes after heat-treatment. The resultant strain hardening gives a higher strength-weight ratio than any heretofore obtained. Thus from a design, aimed originally at economy through machine manufacture, a more serviceable product has resulted.

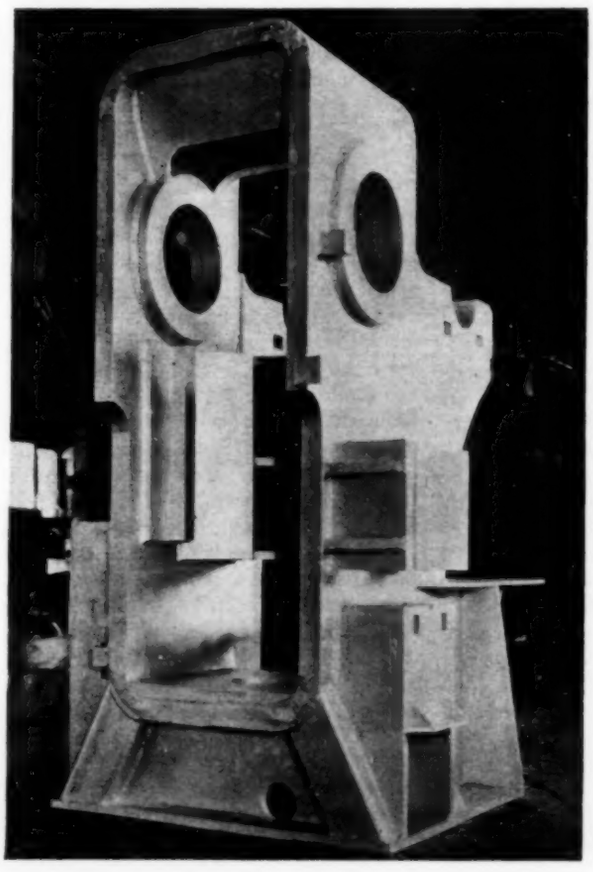
Another instance is the Lukenweld process forging press frame. Here welded construction has eliminated an expensive pattern and has increased strength with a decrease in weight. The housing illustrated weighs 39,685 lb. and is 12 ft. 10 in. high.

A list of specific design factors, compiled by *Product Engineering* and reproduced here, again demonstrates the important part played by manufacturing departments in product develop-

**Design Factors Emphasized**

| | Companies |
|---|---|
| Higher speeds | 170 |
| Larger and heavier units | 78 |
| More automatic operation | 147 |
| Greater precision in use | 158 |
| Decreased power consumption | 120 |
| Improved gearing | 101 |
| Better electrical control | 136 |
| Better springs | 29 |
| Devices to minimize vibration | 137 |
| Better lubrication | 181 |
| Adoption of corrosion-resisting materials | 207 |
| Improved lock washers and locking devices | 116 |
| Closer manufacturing tolerances | 156 |
| More easily replaceable units | 189 |
| Restyling to give new form | 179 |
| Better surface finish | 149 |
| Improved color schemes | 47 |
| Materials adopted for improved appearance | 141 |

**Welded design applied to a forging press frame gives a stronger product at less cost than its cast-iron predecessor**



**A tooth-space tolerance of 0.001 in. was maintained in cutting these Westinghouse Nuttall electric locomotive gears**

ment. The adoption of corrosion-resisting materials is contemplated by 297 companies. Such a change in design involves more than the selection of a new material; it includes also consideration of the manufacturing facilities that will be required to process this material.

In obtaining the corrosion-resistant qualities desirable in the product, a new set of machining and forming characteristics is introduced for which provision must be made in the shop. These materials may work-harden; they may flow differently under pressure or have different reactions to pickling and plating baths. New rake angles are needed in the cutting tools, new coolants are needed in drawing and machining, and new welding methods must be used. Corrosion-resisting materials give the products both greater beauty and wider utility. It is obvious that the attainment of these characteristics involves important changes in manufacturing methods.

Taking another item from the list, we see that 170 companies are redesigning to obtain higher speeds. This again raises the question of shop operations. Parts have to be carefully balanced and bearings fitted with great precision. Higher speeds mean noise unless counteracted by increased accuracy in machining. Such considerations are reflected in the newer methods of precision grinding and boring, the cutting and lapping of gear teeth and the increased attention given gages and fine measuring instruments. The shop is now able to meet dimensions exacting to a degree that would have been impossible a few years ago. This ability opens up a new field of possibilities for the designer.

The Westinghouse-Nuttall gears made for the new Pennsylvania electric locomotives are good examples of this. Though the gears are 52 in. in diameter, tooth spacing is held to limits of 0.001 in. by means of a base tooth gage. Integral tooth contact is also used to obtain quietness and length of life.

We could go down the list of design factors and trace similarly in each item the problems which would be presented to the shop by its adoption. For example, "greater precision in use," "decreased power consumption," "improved gearing," "devices to minimize vibration," and "closer manufacturing tolerances" all involve some of the considerations discussed above.

Better surface finish emphasized by 140 companies, improved color schemes by 47 companies, and materials adopted for improved appearance by 141 companies, may necessitate improved means for buffing and polishing, for applying lacquers or other finishes, for plating with new types of materials.

Another interesting list compiled by *Product Engineering* is that of the materials, constructions, parts and finishes whose adoption is being contemplated.

Without going over these items separately, it can be readily seen that an enormous number of new variables are presented to the shop for solution. A machine is no longer constructed of plain cast iron and carbon steel. The shop personnel must understand methods of tooling for a great variety of materials. It must be prepared to assemble parts that require a different technique as for instance preloaded antifriction bearings.

To be of maximum value to his company, the product designer should be thoroughly conversant with improvements in materials and methods of manufacture. In these may rest the keystone for his new design. But alert as he may be, it is too much to ask that one man be familiar with the wide front along which materials and methods progress is advancing today.

Product development must be a cooperative job. The plan of manufacture must develop with the design. This procedure will give those responsible for manufacture an opportunity to explore modern ways of decreasing costs and of improving the product.

When this activity is carried out by the production man simultaneously with the work of the engineer, completion of the design will see a plan of manufacture already formulated. The shop will know what is required in new machines, small tools, dies, jigs and fixtures. It will be able to swing into production without the delay of an entirely separate approach to the new tasks it is called upon to meet.

Thus we see that the shop executive plays a vital part in product design. Upon him devolves the duty of supplementing the designer's search for new materials and new methods. An aggressive acceptance of this responsibility will enable him to increase sales and to build company profits.

### Materials, Constructions, Parts and Finishes Whose Adoption Is Being Contemplated

(*Based on 170 Companies*)

| | Companies |
|---|---|
| **Materials** | |
| Alloy cast iron | 24 |
| Alloy steels | 16 |
| Malleable iron | 12 |
| Stainless steels | 36 |
| Aluminum or its alloys | 32 |
| Copper-nickel alloys | 5 |
| Magnesium alloys | 23 |
| Copper, brass and bronze | 27 |
| Fiber | 10 |
| Rubber | 15 |
| Cork | 10 |
| Porcelain | 7 |
| Wood, plywood, pressed wood, etc. | 4 |
| **Construction** | |
| Steel castings | 11 |
| Forgings | 17 |
| Die-castings, (zinc or aluminum alloys) | 26 |
| Pressed metal parts | 21 |
| Rolled, drawn, or extruded shapes | 23 |
| Welded construction | 20 |
| Molded parts | 17 |
| **Parts and Units** | |
| Ball or roller bearings | 17 |
| Electric motor drive | 11 |
| Gasoline engine drive | 4 |
| Clutches | 8 |
| Flexible couplings | 8 |
| Universal joints | 6 |
| V-belts | 16 |
| Silent chain or roller chains | 14 |
| Flexible shafting | 10 |
| Speed reducers | 10 |
| Variable-speed transmissions | 11 |
| Pumps and controls for hydraulic operation | 17 |
| Self-lubricating bearings | 12 |
| Gun-type lubrication | 7 |
| Central lubrication system | 18 |
| Oil filters | 12 |
| Electric heating units | 11 |
| Auxiliary control apparatus (indicating, recording, regulating, timing, counting, etc.) | 15 |
| Lacquer, varnish, or Japan finishes | 12 |
| Porcelain enamel finish | 7 |
| Chromium, cadmium, nickel, and other plating | 48 |

## Kate Gleason

News of the death of Kate Gleason at 67, a victim of pneumonia, will cause many an old timer in the industry to pause and recall her visits to his shop as a sales representative of her father's company in Rochester. Some of them will recollect her first visit which usually resulted in the discomfiture of some smart engineer who undertook to entangle her on gear problems. There is no record of any one making much progress in that direction.

Miss Gleason started to learn the gear business at the age of eleven, and she early expressed her ambition to become a mechanical engineer. She completed a year in the mechanical engineering school at Cornell University but left there to travel for the Gleason organization, in the United States and abroad. Later she became secretary and treasurer of the company. Her engineering ambition was realized when she was elected the first woman member of the American Society of Mechanical Engineers.

She was also the first woman president of a bank, the first woman to be appointed a receiver in bankruptcy and the first woman member of the Verein Deutscher Ingenieure. More recently she became interested in low-cost housing and was instrumental in creating a model community of 100 houses of standardized design erected by unskilled labor. Her own home, patterned after the Alhambra, was distinguished by a private apartment entered by a ladder.

# Shop Equipment Review

**Machinery, tools, general plant equipment, materials, parts and mechanisms described in the Shop Equipment News department for the last six months of 1932 are reviewed**

TWENTIETH consecutive issue of the Shop Equipment Review, the present number is noteworthy for containing so many condensed descriptions of equipment announced during a depression period. The total comes to 335 items. When the items from the July, 1932, review are added, the grand total for the year is approximately 800, an impressive figure for the times.

During the last three years certain trends in machine tool construction have become evident. Machines announced in the last six months of 1932 largely follow these trends and exhibit further refinement and ingenuity. Certain of the more standard types of equipment are absent from these review pages, because somewhat earlier many manufacturers took advantage of the slack period and the improved materials and units on the market to modernize their lines thoroughly. Thus, in a measure, the equipment reviewed in this number represents a broadening of the range of modern "master tools of industry" now available. And with the issues published previously, this review number forms a record of importance to the entire metal-working industry.

The two most recently sought after qualities of production machinery are flexibility and ease of control. Both are vitally important if new machines are to show lower costs on reduced volume of manufacturing. Flexibility is achieved in various ways. In the case of precision boring machines and way-type drilling machines, the heads can be quickly relocated on pads or by other means. On lathes and milling machines such a wide range of speeds and feeds is now common that the cemented carbide cutting materials can be employed efficiently for a wide range of work on the same machine.

Ease of control is achieved by centralizing the controls and by incorporating hydraulic mechanisms or providing individual motor drive to each function. In the case of hydraulic systems one or two valves with the requisite porting arrangements will give an antomatic or semi-automatic cycle. The same thing is obtained from the electrical systems through a centralized panel-board with an arrangement of relays and switches.

Other general trends that continue to be followed are: accessibility, increased weight and rigidity, extensive or complete use of anti-friction bearings, direct motor drive and more power input, heat-treated alloy steel gears and spindles, alloy cast irons for beds and columns, hardened steel ways, covered ways, light alloys for removable or reciprocating members, large feed and speed dials, force-feed lubrication systems, large reservoirs for the increased quantities of coolant now generally used on production machines and large tanks to maintain oil for hydraulic systems at the correct temperature.

A glance over the pages reveals that a vertical turret lathe has all the functions motorized so that higher speeds and greater applied power make the machine suitable for carbide tools. A newcomer among precision finish boring machines feeds the heads instead of the table, the object being to obtain twice the production. Other units of this class feature ease of loading and hydraulic operation. One manufacturer has introduced a complete line of three machines, including a bench model, a single-end floorstand model and a double-end model intended for simultaneous operation on a part such as a cluster gear from both ends. Hydraulic gear chucks, chip exhaust systems and electric spindle brakes are applied as required. In one chucking machine all tools and all chucks can revolve and various combinations of stationary and revolving elements can be worked out so that considerable flexibility is obtained. In another chucking machine twelve positions for end-cutting tools can be had through the main tool turret and a hexagon turret attachment.

Drilling from opposite sides without resorting to a trunnion-type fixture is permitted in a station-type drilling and reaming machine having several spindles by tilting the work in its nest. Self-contained hydraulically-fed drilling units to be built into existing equipment or to be attached to suitable bases are offered.

One finished gear is obtained from a "completing" gear generator at every 90 deg. of index. Roughing with a cutter is done at one station; finishing by the generating method at the opposite station. Crossed-axes cutting used in a gear finishing machine results in greater accuracy. A lapping machine is automatic in operation.

Another newcomer is an internal grinder for short-run work up to 8 in. in diam. by 8 in. long. Surface grinders were announced in three horizontal models and one vertical model, an unsual number for this type of machine. Automatic force-feed lubrication is standard on all lathes built by one company. Fast spindle speeds and a shockless indexing mechanism contribute to better finish and output of an automatic. Of importance in connection with automatic machinery and with many other kinds of machinery is an electric machine-time recorder. It records the pieces produced, set-up time, operating time, down time and provides for entries by the operator and inspector. The record is exceptionally complete and forms a valuable means for correcting machine set-up and detecting leaks in production. Individual cam lobes are being made for B.&S. screw machines.

Two exceptionally large rail-type milling machines were completed. One weighs 275 tons and the other 350 tons. The first will machine work 15 ft. wide by 11 ft. high and the second, work 16 ft. by 16½ ft. high. Standard die-sinking tools only are used for making either straight or cherrying cuts on a universal die-sinking machine which has micrometer rings and binders on all slides. Cam-type milling machines are now built for short-run work and to be changed over quickly, using inexpensive fixtures.

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AMERICAN EDITION


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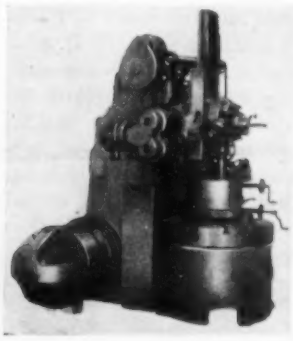
## Boring and Turning Machines

### Turret Lathe, Vertical

*Bullard Co., Bridgeport, Conn.* (Vol.76,p.1210.) 266.

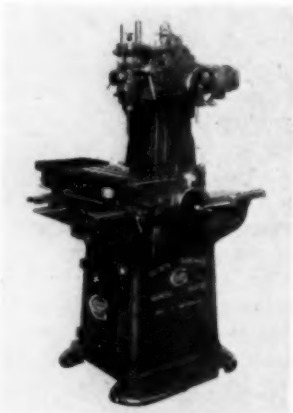
Complete motorization of the company's vertical turret lathe for a high-speed model has been undertaken. In the case of the 42-in. machine, for example, it is possible to obtain table speeds ranging from 4.1 to 150 r.p.m. for the use of the carbide tools. Motors are used for the main drive, power traverse, rail-raising mechanism, and lubricant pumps. All motors are of the ball-bearing, inclosed type.



### Boring Machine, Jig, Model MP-2C

*R. Y. Ferner Co., Investment Bldg., Washington, D. C.* (Vol. 76,p.1237.) 251.

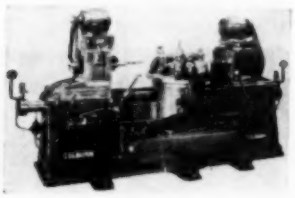
Capacity is for boring holes in an area of 8x12 in. Distance between work table and spindle nose is 13½ in. Work table measures 10¾x18 in., and is mounted on a much longer table so that the work table does not overhang in any position. Lead-screws for the table movement are guaranteed to provide adjustment to 0.0005 in. by means of micrometer verniers. Maximum error of spaces between holes is guaranteed not to exceed 0.00015 in. Spindle speeds range from 190 to 3,000 r.p.m. Machine will drive drills as small as No. 57 or as large as 0.6 in. in cast iron. It will bore to 1⅞ in. The spindle has a 4-in. feed. A circular table for polar coordinate work can be furnished.



### Boring Machine, Finish, Hydraulic-Feed

*Consolidated Machine Tool Corp., Rochester, N. Y.* (Vol. 76,p.952.) 25.

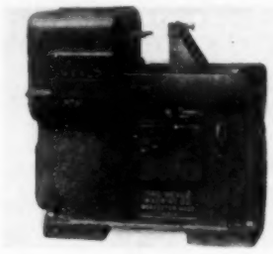
The Colburn finish-boring machine uses either diamond or tungsten-carbide tools and has hydraulic feed. The machine is designed for rapid production of small parts of cast-iron or non-ferrous metals. As illustrated, it is equipped with five spindles, three in the right-hand head, and two in the left-hand head. It is said that by feeding the heads instead of the table it is possible to get practically twice the production since all spindles in both heads are working simultaneously. Spindle speeds up to 2,620 r.p.m. are furnished.



### Boring Machine, Finish, "Bore-Matic"

*Heald Machine Co., Worcester, Mass.* (Vol.76,p.1114.) 184.

A single-end precision finish boring machine utilizing diamond or tungsten-carbide tools, the No. 47 "Bore-Matic" is



automatic in operation. It provides a fast boring cycle, easily changed boring speeds and convenience of operation, including loading and unloading. Table drive is hydraulically effected, and feeds range from 1 to 25 in. per min. A finished pad in the center, 16 in. wide by 22¾ in. long, has three longitudinal T-slots. Spindle speeds can be varied from 1,200 to 5,000 r.p.m. The boring heads are the solid, one-piece body, ball-bearing type. Three sizes of boring heads are furnished, covering a range of bore diameters from ⅞ to 6¼ in. Maximum length of hole bored, 7 in.

### Boring Machine, Diamond or Carbide, "Cimatool"

*City Machine & Tool Works, East Third at June St., Dayton, O.* (Vol.76,p.1144.) 144.

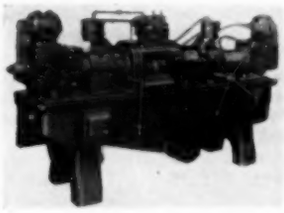
For boring holes up to 6 in. in diameter with diamond or carbide tools, this machine is built in both single- and double-end types and with one or more

spindles. The revolving spindle is fixed, while the work is carried on a reciprocating table that is fed to the spindle. Required sequences of traverse and feed movements are obtained by hydraulic valves.

### Boring Machine, Diamond, "Duobore"

*City Machine & Tool Works, East Third at June St., Dayton, O.* (Vol.76,p.1178.) 145.

Simultaneous diamond boring of work from opposite ends is the function of the "Duobore"

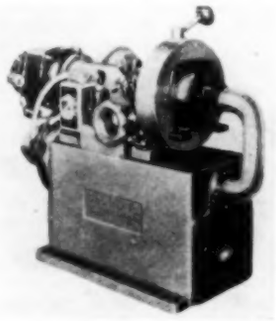


machine built for boring all kinds of transmission gears. Equipped with Bolender hydraulic gear chucks. Boring spindles are fed forward through the chucks. Spindles are supported by ball bearings. Each spindle is driven by motor. A third motor actuates cams which feed the spindles.

### Boring Machine, Diamond, Bench-Type

*City Machine & Tool Works, East Third at June St., Dayton, O.* Vol.76,p.1142.) 143.

Holes up to ¾ in. are bored. The machine is semi-automatic in operation. It has a magnetic chuck, exhaust system for chips,

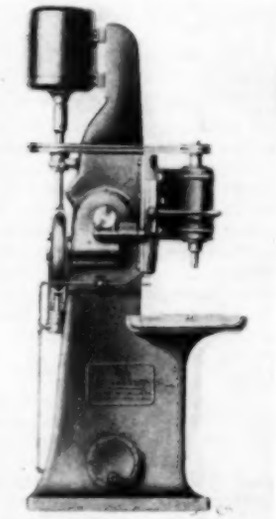


and an electric spindle brake. Machine takes small motor frames and similar parts with bronze or babbitt bearings.

### Boring Machine, Diamond, Vertical

*Automatic Machine Co., Bridgeport, Conn.* (Vol.76.p. 1142.) 177.

Two sizes are built, each equipped with single or double

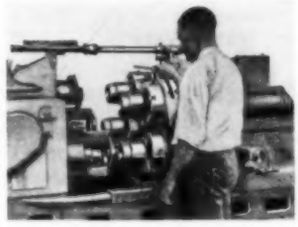


spindles. In the double-spindle design, the spindles are adjustable, center to center. The feed mechanism is by a cam, whereby roughing or coarse feed on the down stroke and a finer feed on the up stroke are secured. The boring spindle is provided with a fine adjustment to the boring tool, graduated in ten-thousandths.

### Chucking Machines, Multiple-Spindle

*Goss & DeLeeuw Machine Co., New Britain, Conn.* (Vol. 76,p.1016.) 97.

All the tools and all the chucks can revolve simultaneously on "Duplex" multiple-

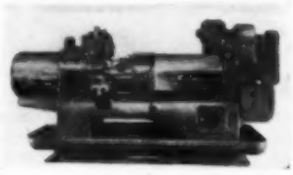


spindle chucking machines. Two standard cross-slides are provided. Each chuck, as it indexes into the loading position, is thrown out of engagement and stops to enable the operator to unload the finished piece. The smallest machine is 6x6¾ in. The largest machine is the 11x10-in. size. Chuck spindles are anti-friction mounted.

### Chucking Machines, Six-Spindle, Model M

*Cleveland Automatic Machine Co., Cleveland, O.* (Vol.76, p.1205.) 237.

Bar machines are built in ⅝, 1¼ and 1½ in. sizes; chucking machines, 4¾ and 6½ in. Slide positions sufficient to take six forming or shaving tool operations are provided, and twelve positions are available for end cutting tools to be operated from the main tool turret or the



hexagon turret attachment. A second double top slide can be mounted.

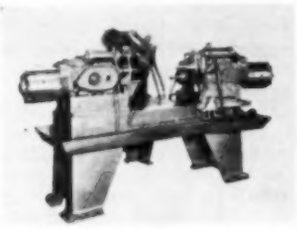
Spindle change gears cover a wide range of speeds and are mounted on the outside of the drive head to permit rapid changing. Threading and reaming spindles are accelerated and operated independently of the tool feed. A wide range of tool feeds eliminates necessity for special camming. Optional chucking includes air, hydraulic or mechanical types. Positive trip for the threading spindle is controlled by the spindle travel. Feed gears have helical teeth.

## Drilling Machines

### Drilling Machine, Four-Way

*Millholland Corp., 1145 E. 22nd St., Indianapolis, Ind.* (Vol.76,p.954.) 58.

This four-way machine drills angular holes in small forgings, in which it is desired to obtain extreme accuracy of location and to eliminate the straightening operation after drilling. When the piece is placed in the

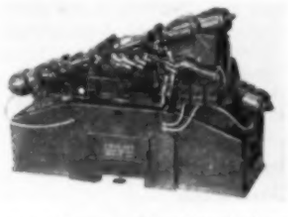


fixture, the bosses fit against pads which prevent springing when the holes are drilled. An air valve starts the feeds on all the drilling units simultaneously, and these units go through their cycle independently and then stop. The machine can be constructed for a number of different set-ups.

### Drilling and Reaming Machines, Indexing

*Kingsbury Machine Tool Corp., Keene, N. H.* (Vol.76, p.985.) 77.

A new principle is claimed for the Type TA power indexing, drilling and reaming machine in that the work is tilted in its nest, permitting drilling from opposite sides without resorting to the trunnion-type in-

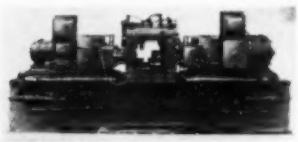


dexing figure. Completed pieces are obtained at each indexing. Dial indexing is controlled by means of a treadle, leaving the operator's hands free for loading. Any work requiring opposed operations with a maximum of three operations from one direction and one from the opposite direction may be handled in this type of machine.

### Drilling Machines, Horizontal, Production, Nos. 6-HH and 8-HH

*Baker Bros., Inc., Toledo, O.* (Vol.76,p.1147.) 163.

In these machines, standard saddles are mounted on each end and are arranged with drive brackets for the multiple-spindle heads. Heads designed to suit the work are mounted on the



front facings of the drive brackets. The machine bed is made of sufficient length and plenty of head travel is provided to allow using the machine for other work. Each end of the machine has its own oil-feed unit and also the "Twin Pull" feed with two cylinders out in the open for quick adjustment and repair. All machines are arranged with an automatic cycle.

### Drilling Machine, Station-Type, Hydraulic-Feed

*National Automatic Tool Co., Richmond, Ind.* (Vol.76,p.1115.) 175.

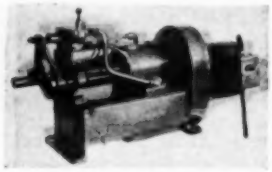
Both vertical and horizontal heads may be arranged on the station-type, hydraulic-feed, multiple-spindle drilling machine. This machine may be arranged for either 3, 6 or 8 stations. In-

dexing is accomplished by an automatic, mechanical indexing mechanism. The Natco "Hydro Uni-Power" system of hydraulic feed is provided, which is semi-automatic in operation.

### Drilling Units, Hydraulic

*Hoefer Mfg. Co., Freeport, Ill.* (Vol.76,p.1112.) 181.

A series of self-contained hydraulically fed drilling units is being offered to be built into existing equipment or to be attached in any number or size to suitable bases. Standard cycle is rapid approach, feed, rapid return and stop or repeat. For honing operations the unit can

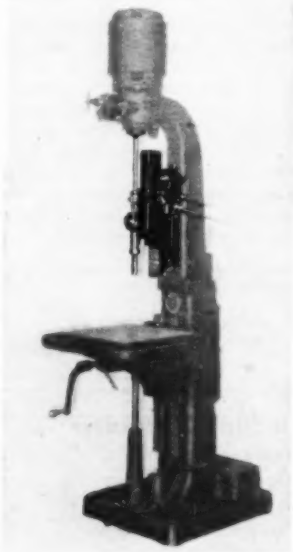


be made to reciprocate continuously at the rapid traverse rate of 40 in. per min. in both directions. Feed rates are available in any amount up to the rapid traverse rate. Cycle control is by two buttons carried on a slotted bar attached to the control valve. Sizes, up to 10 hp.

### Feed for Drilling Machines, Hydraulic

*Leland-Gifford Co., Worcester, Mass.* (Vol.76,p.1172.) 221.

Sensitive drilling machines built by Leland-Gifford may now be equipped with the same hydraulic feed that has been furnished for a number of years on the "Unit-Cycle" machine.



This feed is applicable to either the belt or motor-spindle machine.

Either a continuous or a step-by-step control can be supplied for the hydraulic feed. Ordinary twist drills may be employed at a large saving in cost over gun-barrel drills when the step-by-step method is used for deep holes.

Usually the maximum feed is 6½ in., although when long holes are to be drilled a feed of 10 in. can be furnished. Feed ranges from 0 to 40 in. per min. Rapid approach, return and automatic stop are provided by the cycle.

### Drill, Portable, Gasoline "Togglebug"

*Guibert Steel Co., Pittsburgh, Pa.* (Vol.76,p.843.) 33.

For drilling holes in shapes and in plates, slabs or timbers away from electric power, the gasoline portable "Togglebug" drill has spindle speeds of 250 to 600 r.p.m., and can drill 1½ in. holes and smaller through 12 in. of metal. Power is furnished by a 6-hp. gasoline motor. Coolant is applied from a tank. A system of weights and counterweights give the Togglebug the necessary pressure required for drilling large holes.

## Gear-Cutting and Finishing Machines

### Gear Generating Machine Completing, No. 9

*Gleason Works, Rochester, N. Y.* (Vol.76,p.1077.) 141.

Rough and finish cutting of differential gears and pinions is done in the No. 9 completing generator. These operations were formerly done on two separate machines.

Roughing the teeth is accomplished with an inserted formed

blade cutter, while the finish cutting is done by the generating method using two reciprocating tools. One finished gear or pinion is obtained for every 90 deg. of index of the turret drum. For the roughing cutter, cutting speed can be varied from 104 to 202 ft. per minute through change gears. An overhead tie between the cradle housing and turret housing provides rigidity to the finish cutting unit.

### Finishing Machine, Gear, "Red Ring"

*National Broach & Machine Co., Shoemaker & St. Jean Sts., Detroit, Mich.* (Vol.76,p.1206.) 230.

The machine cuts at an angle to the axis of the gear and generates the shape of each tooth in the same direction as that taken by the teeth of two mating gears sliding over one another. Operation of the machine is fully automatic. The tool is in the form of a gashed helical gear. The tool will handle between 300 and 500 work units before grinding.

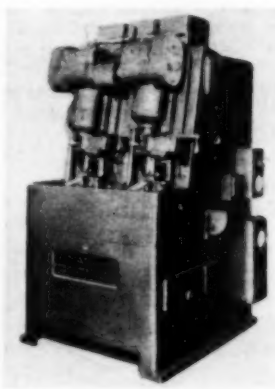
The table has a longitudinal reciprocating movement and a vertical feed. Both movements are automatic. Both faces of each tooth on the work gear are subjected to the action of the cutter during every table cycle.

One motor drives the cutting tool arbor; another, the table movements.

### Burring Machine, Bevel-Gear

*City Machine & Tool Works, East Third St. at June St., Dayton, O.* (Vol.76,p.921.) 23.

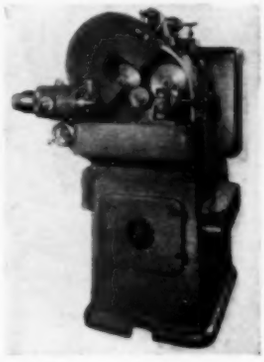
This large, special burring machine removes the burr thrown up in hobbing the bevel gear on automobile axle shafts. The machine is of the two-spindle type, each spindle being independent. The machine is capable of a six-second cycle. The machine embodies four motors.



### Lapping Machine, Gear

*Fellows Gear Shaper Co., Springfield, Vt.* (Vol.76,p.1049.)

The work spindle is driven through change gears, and the three laps are rotated by the action of the work. Friction brakes are applied to spindles so that the pressure can be varied. Drive for the reciprocating motion and drive for the rotary motion of the work are independent, so that the rotative speed and number of strokes can be varied. The two upper lap spindles can be set at a slight angle with relation to the axis of the work, to correct slight errors in the axial relationship of the teeth. The machine is



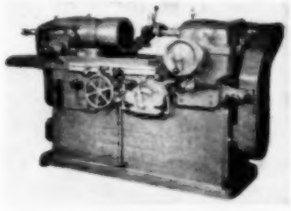
automatic in operation. A switch can be set for any one of eight numbers of work revolutions.

## Grinding Machines

### Grinder, Internal, Hydraulic

*Pratt & Whitney Co., Hartford, Conn.* (Vol.76,p.917.) 41.

This internal grinder is built by Taylor & Fenn Co., Hartford, and marketed by the above concern. It is offered for short-run work. Straight and taper holes up to 8 in. in diameter and 8 in. long can be ground. The work reciprocates instead of the

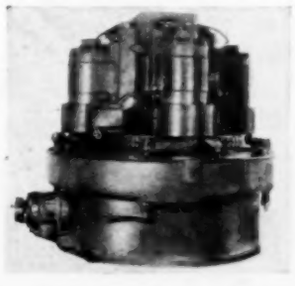


wheel-head. When grinding, the wheel contacts with the back of the hole. Table speeds range from 0 to 44 ft. per min. Workhead swivels 15 deg. Quill, naked and sleeve-type ball-bearing wheel-heads can be furnished. Swing is 16 in.; table travel, 20 in.

### Grinder, Surface, Vertical

*Hanchett Mfg. Co., Big Rapids, Mich.* (Vol.76,p.838.)

The machine will perform roughing, semi-finishing, and finishing cuts on a piece without removing it from the fixture.

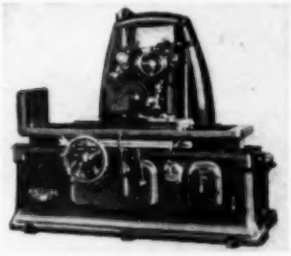


Three motor-driven heads are fitted. The ring-type table is 72 in. diam. by 16 in. wide. The table has a speed range of $\frac{3}{4}$ to 3 r.p.m. Each 18-in. wheel is driven by a 15-hp. motor. Vertical feed of the grinding wheel heads is obtained automatically.

### Grinder, Surface, Hydraulic

*Mattison Machine Works, Rockford, Ill.* (Vol.76,p.1014.)

Intended for toolroom work, as well as for production grinding, the 12-14 in. surface grinder has the rotor mounted directly on the wheel spindle and balanced as a unit to eliminate vibration. Table travel is hy-



draulically operated, and speed ranges from 30 to 90 ft. per min. Transverse feed of the wheel is also hydraulically operated. Controls are centralized.

Specifications: Table, 3, 4 or 5 ft. long; wheel head adjustment, vertical, 16½ in.; table feed, hydraulic, with 4 speeds, 30, 45, 60 and 90 ft. per min., using multi-speed, 5-hp. motor.

### Grinder, Surface, No. 0

*Gallmeyer & Livingston Co., Grand Rapids, Mich.* (Vol.76, p.1047.) 115.

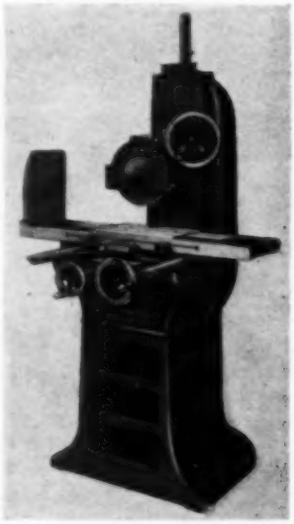
Intended for very delicate, accurate surface grinding, the No. 0 grinder is available in the

column-type or in the bench type. The table is 5x29 in. overall with a 5x12 in. working surface. The 5½-in. cross feed is provided by an Acme screw. A 6x½-in. wheel and a ¼-hp. motor are standard equipment.

### Grinder, Surface, Toolroom, No. 1½

*Abrasive Machine Tool Co., East Providence, R. I.* (Vol. 76,p.1207.) 236.

Feed is by hand since it has been discovered that there is seldom need for automatic feed on a machine of this type. Capacity is as follows: longitudinal, 15 in.; transverse, 10 in.; vertical, 12 in. Surface of

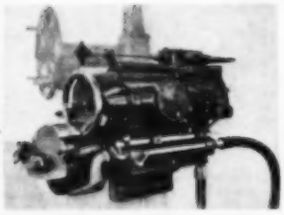


the work table is 15x10 in.; over-all dimensions are 42¾x10 in. Sides of the table are ground square with the spindle and may be used for setting up work. The spindle speed is 1,750 r.p.m. Wheel diameter is 10 in.; thickness, ½ in., and hole size, 3 in.

### Automatic Cross Feed for Surface Grinders

*Norton Co., Worcester, Mass.* (Vol.76,p.1047.) 116.

A hydraulically operated automatic cross feed or wheel

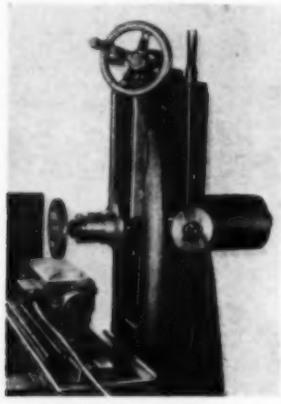


traversing mechanism is now offered for use on the 10x12-in. surface grinder. Maximum efficiency from the grinding wheel is obtained since the wheel can be fed across the work at each reversal by increments that utilize the full width of the standard 1½-in. wheel. The mechanism provides any feed from $\frac{1}{16}$ in. up to 1½ in.

### Grinding Spindle for Surface Grinder, Motorized

*Majestic Tool & Mfg. Co., 2650 Poplar St., Detroit, Mich.* (Vol.76,p.1082.) 129.

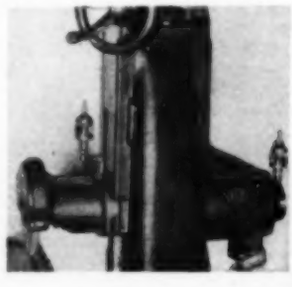
This direct motor-driven spindle for the No. 2 Brown & Sharpe surface grinder is driven by a ¾-hp. motor at 3,450 r.p.m. under full load, and is suitable for grinding splines, slots, keyways and grooves. There is claimed to be no end play in the spindle. To adapt this type spindle to the standard spindle housing requires only reboring the housing.



### Grinding Spindles for Surface Grinder, Motorized

*Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.* (Vol.76,p.1209.)

Both heavy-duty and standard types of direct-motor driven

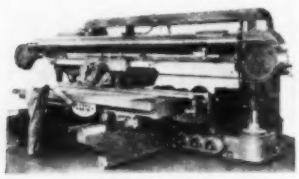


spindles have been developed for use on Brown & Sharpe No. 2 surface grinders. Spindle and motor are mounted on a common shaft. The heavy type takes a special bracket; the standard type requires boring out the machine bracket.

## Grinder and Polisher, Surface, Abrasive-Belt

*Mattison Machine Works, Rockford, Ill.* (Vol.76,p.1140.)

The No. 405 abrasive-belt surface grinder surfaces and polishes stainless steel sheets. Abrasive belts over 40 ft. long work under heavy cutting pressure to assure maximum cutting

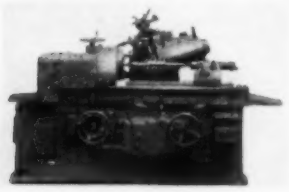


efficiency. A heavy crossrail mounted on the columns carries tracks on which the carriage travels. A sheet is held by two spring-loaded, cushioned, hold-down rolls. In operation, the carriage reciprocates and the water-cooled table slowly moves crosswise.

## Grinder, Worm, Reinecker

*George Scherr Co., Inc., 128 Lafayette St., New York, N. Y.* (Vol.76,p.1241.) 267.

Leads from ¼ to 25 in. can be ground on worms by the Reinecker grinder, which utilizes only one master leadscrew. To cover the above range two ranges are provided. These are ¼



to 1 in., and ½ to 25 in. lead, both right and left hand. Specifications are: Maximum length between dead centers, 29½ in.; maximum grinding length without resetting, 24 in.; maximum diameter of work, 10½ in.; maximum collet diameter in hollow workhead spindle, 3 in.; wheelhead swivels to either side, 45 deg. The machine will grind flanks of hardened or soft worms, single or multiple thread, right- or left-hand. Double-bevel grinding wheels are used so that both flanks can be ground at the same time. Feed is by hand or automatic, the latter being from 0.0001 in. to 0.002 in. Indexing mechanism for multiple-thread worms is fully automatic. A separate plate is required for every number of threads.

## Grinder, Cutter, Universal, No. 375-1

*George Gorton Machine Co., Racine, Wis.* (Vol.76,p.1173.)

The machine grinds to any angle, fluted mills and single-lip, two-lip and three- or four-sided cutters. It handles straight-shank cutters from $\frac{1}{16}$ to $\frac{5}{8}$ in.

in diameter, and is designed for grinding small delicate points down to 0.015 in. and smaller. Almost any length of straight shank cutter can be accommodated.

## Grinder, Carbide-Tool

*Tool Metals Co., 439 E. Fort St., Detroit, Mich.* (Vol.76,p.1140.) 160.

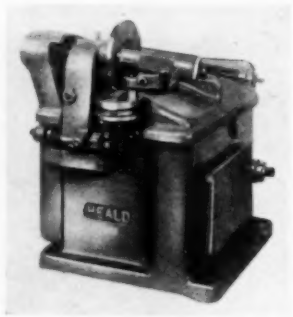
The grinder is equipped with two tiltable 30-deg. tables graduated and arranged with 4½ in. movement. Both tables are provided with grooves to guide the diamond dresser. The machine is equipped with two 12 in. by 4x2 in. wheels. A diamond lapping disk can be supplied. A full universal vise (separate

item) for grinding and milling tool-bits and miscellaneous work has three sets of graduations for obtaining various angles in six directions. It is made in 4- and 6-in. sizes.

## Grinder, Carbide-Tool

*Heald Machine Co., Worcester, Mass.* (Vol.76,p.1146.) 186.

Once having set the toolholder for the desired clearance angle

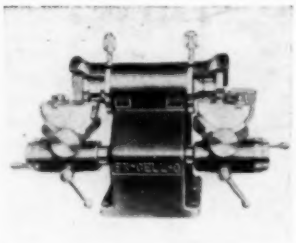


and the wheel for the radius, the operator merely inserts the tool in the holder, turns the switch and the tool is sharpened automatically. One toolholder with adapters for $\frac{3}{32}$ in., $\frac{5}{16}$ in., $\frac{3}{8}$ in. and ½ in. tools is furnished. The machine is used for sharpening carbide tools used with "Borematic" finish-boring machines.

## Grinder, Carbide-Tool

*Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.* (Vol.76,p.1142.) 185.

The inbuilt balanced motor has double shaft projections for the grinding wheel and the lapping disk. The ring-type grinding wheel is 6 in. in diameter with a 1¼-in. grinding surface. The special cast-iron lapping disk is 6 in. in diameter. An adjustable table is provided on

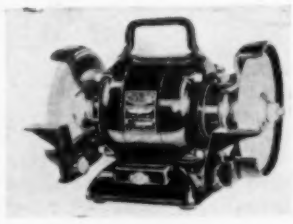


each side of the machine. Each table is mounted on a circular dovetail slide. A parallel guide permits lateral movement of the tool across the face of the wheel.

## Grinder, Bench, 6-In.

*Van Dorn Electric Tool Co., Towson, Md.* (Vol.76,p.1238.) 260.

This 6-in. electric bench grinder differs from the standard model only in that bronze sleeve bearings are employed instead of ball bearings. It is portable and is furnished with two 6x½ in. wheels, one coarse and one fine.



## Grinder, Chaser, Bench-Type

*National Acme Co., Cleveland, O.* (Vol.76,p.1112.) 125.

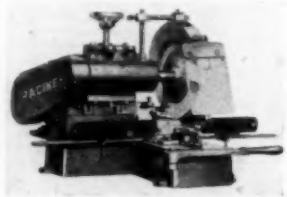
On the No. 0 the knee can be raised or lowered, or the table moved away from the column, so that a wide range of sizes may be handled quickly. Table travel is 13 in.; cross-slide movement is 5½ in.; and vertical slide movement, 6 in. The motor is a fully inclosed ball-

bearing ½-hp. type. The double-ended motor spindle is arranged for a guarded grinding wheel on one end and guarded wire brush at the other end.

## Grinder, Hacksaw-Blade

*Racine Tool & Machine Co., Racine, Wis.* (Vol.76,p.1141.)

For grinding high-speed steel hacksaw blades, this grinder may be used to regrind each blade three to six times. The wheel remains in a fixed position, the blade being fed across the wheel. Smaller blades may be reground in from 1 to 1½

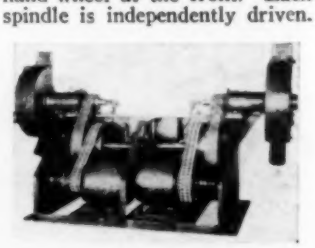


min. each. Teeth are slightly undercut. Capacity, blades from 1 to 2 in. wide by any length.

## Grinders and Buffers, Variable-Speed

*Production Equipment Co., 5219 Windsor Ave., Cleveland, O.* (Vol.76,p.1046.) 105.

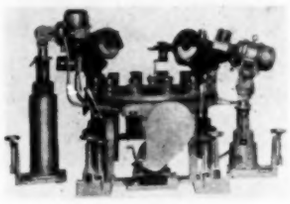
Variable spindle speeds to suit requirements for grinding, buffing and polishing may be secured on this two-spindle floor-stand machine. Speed control is made possible by use of Reeves variable-speed pulleys. A tachometer indicates the spindle speed, which is adjusted by a hand-wheel at the front. Each spindle is independently driven.



### Polishing-Buffing Machine, Automatic No. 2

*Packer Machine Co., Meriden, Conn.* (Vol.76,p.1177.) 197.

This machine can be furnished with four or five wheel-heads, each driven by a ball-bearing, dustproof motor. Wheels can be set to any angle from horizontal to vertical, and they swivel. Work up to 12 in. in



diameter is the maximum that can be buffed or polished. The worktable has 12 spindles, each with an automatic expansion chuck. It rotates with intermittent motion.

### Exhaust System for Grinder

*Standard Electric Tool Co., 1938 W. Eighth St., Cincinnati, O.* (Vol.76,p.844.) 15.

Inclosed, hinged door guards are fitted to the machine. On the back of the pedestal is mounted a ¾-hp. 3,600-r.p.m. motor-driven exhaust system fitted with a dust-collecting bag.

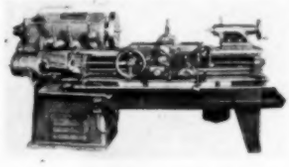
This completely assembled unit eliminates the necessity for installing an elaborate dust exhaust system.

## Lathes

### Lathe, Engine, Toolroom

*Reed-Prentice Corp., Worcester, Mass.* (Vol.76,p.922.) 28.

Sliding-gear head toolroom lathes are now available in 8- and 16-speed, 14, 16, 18 and 20 in. sizes. Features now incorporated include: quick-change gearbox with leadscrew reverse mechanism, and an anti-friction end work. The quick-



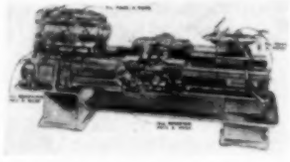
change gearbox provides 49 thread changes from 1½ to 96 and 49 feed changes from 0.0035 to 0.224 in. An auxiliary quadrant also provides for additional gears for odd or metric threads and feeds.

A leadscrew reverse mechanism provides for reversing the carriage when feeding or threading without reversing the direction of rotation of the spindle. Thread dials are provided for catching leads of long screws when the carriage is run back by hand.

### Lathes with Automatic Lubrication

*Monarch Machine Tool Co., Sidney, O.* (Vol.76,p.1046.) 71.

Automatic force-feed lubrication for the bed, carriage, apron and compound rest is now standard equipment on all the company's lathes. The lathes



have only 14 places that need occasional lubrication.

The apron has an oil reservoir which holds from 1 to 2 gal. A pressure pump supplies oil under pressure to every part of the carriage. The amount of oil is metered to each point. Filtered oil is supplied automatically to the Timken spindle bearings.

The headstock is oiled by the splash system and requires attention once a year.

### Lathe, Engine, 24-In.

*Springfield Machine Tool Co., Springfield, O.* (Vol.76,p.1147.) 192.

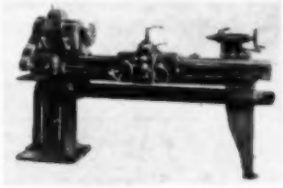
Twelve changes of speed in the headstock and 36 changes of threads and feeds in the gearbox are provided. The headstock employs hardened and lapped gears running in oil.

Large Timken precision roller bearings carry the spindle. Hole through the spindle is 2⅜ in. The gearbox is provided with a centralized oiling system, sending oil to all bearings from two reservoirs. Bed width has been increased by 2 in. Weight, with 12-ft. bed, 11,450 lb.

### Lathe, Engine, "Super Regal"

*LeBlond Machine Tool Co., Cincinnati, O.* (Vol.76,p.1172.) 209.

A simplified engine lathe at a popular price, this "Super Regal" lathe embodies features for safe, simple control and



automatic lubrication. In addition to the eight selective speed changes, the feed reverse and feed compounding gears are inside the headstock to eliminate tumbler gears and swinging plates on the end of the lathe. All gears are of steel, heat-treated and normalized. Controls are centralized. Drive is by V-belt to eliminate headstock vibration. The lathe is built in 12 and 14-in. sizes with any bed length required.

A plunger pump in the apron reservoir lubricates the carriage and cross-slide ways and the cross-feed screw bearings. One safety interlocked trip lever controls both carriage cross-slide movements and is tripped easily. The motor is mounted on a hinged plate at the rear.

### Automatic, Four-Spindle, Model R

*National Acme Co., Cleveland, O.* (Vol.76,p.1108.) 183.

Collet capacity of ⅞ in., high spindle speeds for small diameter work and a fast, shockless indexing mechanism are found in the Model R Gridley automatic. The "Acme-Graybar Chronolog" (*AM*-Vol. 76, page 1045) is furnished. Width of the spindle carrier bearings has been increased and likewise the overall length of the carrier, affording better support under heavy forming cuts. Tooling on the main slide is always readily

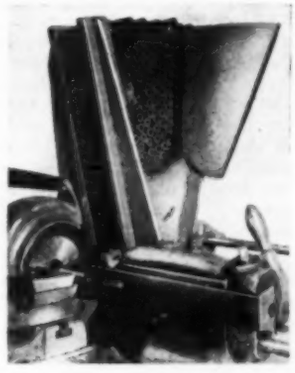
accessible. Two die slides in the second and third positions are open for independently operated threading attachments. Second and third position cross slides are mounted at an angle so that every tool and holder is accessible. The two bottom cross-slides are operated from cams on separate drums. Standard size of machine, ⅞ in.; maximum turning length, 5 in.; spindle speeds, 272 to 2,579 r.p.m.

Two large shafts support the chucking and feeding slides to prevent binding or wear. A safety clutch is built into the worm gear that drives the feed and index mechanism. The front disk of the stock reel turns in a reel guide mounted directly on the end of the frame and pan to afford rigidity. Reel pipes are mounted in ball bearings. A lubricating pump directly over the gearbox forces oil to a series of visible oilers.

### Magazine for Automatic Lathe

*Pratt & Whitney Co., Hartford, Conn.* (Vol.76,p.844.)

Developed to increase the loading capacity of the 1x18 in. full automatic lathe, with this larger magazine the operator can handle several more machines than with the smaller



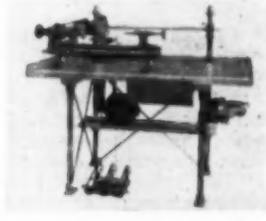
type of magazine, thus reducing labor cost per piece from 30 to 45 per cent. The magazine has a hinged door on one side to facilitate loading. The work is placed with corresponding ends all one way.

It is shown set up for a cast-iron automotive valve stem guide. Three hundred pieces comprise a full load and represent about 75 minutes of work.

### Lathe Drive Unit, Bench, Six-Speed

*Hardinge Bros., Inc., Elmira, N. Y.* (Vol.76,p.1242.) 239.

The Cataract six-speed motor drive employs three treadles and a two-speed reversible motor. It gives six forward and reverse



speeds. The design eliminates gears and clutches, and by the use of endless belts prevents noise, chatter and vibration.

The unit comprises a bench, two-speed reversible motor, controls for motor, treadles, steel drawer, collet board, shelf for motor, drive shaft, endless belts, pulleys and other parts.

### Drive for Bench Lathe

*South Bend Lathe Co., South Bend, Ind.* (Vol.76,p.1112.) 124.

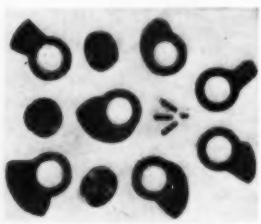
In the underneath belt motor drive the down-pull feature provides a steady drive. Drive is by belt from a reversing motor mounted under the bench, di-

rectly beneath the headstock. The lathe is of the back-geared, screw-cutting type and is available in 8, 9 and 11-in. sizes. It will cut all standard screw threads, right and left hand, from 2 to 90 per in., including 11½ pipe thread. An easy reading index plate has been added to show at a glance the proper gearing required to obtain any tool feed in the wide range provided. There are six spindle speeds. A belt guard for the cone pulley is an optional feature.

### Unicams for Screw Machines

*Fischer Special Mfg. Co., Morgan St., Cincinnati, O.* (Vol.76,p.1048.) 53.

Cam lobes of standard lengths and rises are produced. By assembling these individual lobes on a spool, a lead cam of the required number of lobes can be built up which will do the work of a solid cam. Unicams are made in 3½, 4, 4½, 5, 6, 7

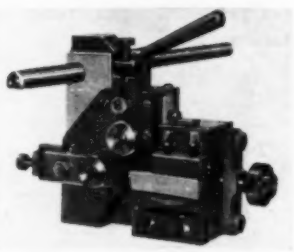


and 9 in. diameters, and thicknesses of $\frac{5}{16}$ and $\frac{1}{4}$ in. to fit the No. 00, No. 0 and No. 2 Brown & Sharpe automatics. The cams are made with standard rises up to 3 in. in height, with a variation between rises of 0.020 in. The lobes are adjustable around the cam circle by single hundredths. Indexing space for different machine times can thus be varied by single hundredths. To use this built-up cam, a lead cam lever with a wide roller and several other parts are substituted for the ones on the machine, after which either Unicams or solid cams can be employed. Different lobes are made for fast and slow machine times.

### Taper Turner

*Prydz-Ziegler Mfg. Co., 915 Washington Ave., South, Minneapolis, Min..* (Vol.76,p.1083.) 106.

Tapered bolts and pins up to 2½ in. are produced by the universal roller taper turner. An attachment has also been developed for boring internal tapers. The cutting tool is regulated by the taper governor (long bar at the top) which is round and has a flat taper on the one side.



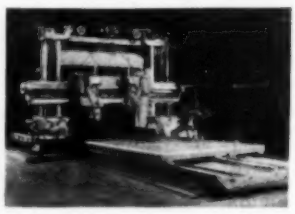
The device can be used for both straight and tapered bolts without changing tools.

## Milling Machines

### Milling Machine, Rail-Type

*Ingersoll Milling Machine Co., Rockford, Ill.* (Vol.76,p. 982.) 85.

This machine has capacity for a casting 15 ft. wide, 11 ft. high and 40 ft. long. The bed is 80 ft. long. Overall height is 20 feet. The machine weighs nearly 275 tons. Four motorized heads—two vertical, on the cross-rail, and two horizontal, one on each housing. Machine



is equipped with a right angle boring and milling attachment, which includes a high-speed drilling attachment.

All controls are centralized. The feed motor is independent and gives variable speeds. It provides feed and rapid traverse in either direction to the table, rail, heads, and quills. Limit switches provide against overtravel of the table, rail, or any of the heads.

### Milling Machine, Rail-Type

*Schiess-Defries, Kolnerstrasse 114, Dusseldorf, Germany.* (Vol. 76,p.1080.) 135.

The machine weighs 350 tons and is capable of taking work up to 16 ft. wide by 16½ ft. high. It has four heavy milling heads, each with two separate motors, one for drive and one for quick movement and feed.

These milling heads are entirely independent. A large number of milling speeds and feeds and also boring feeds is provided. Furthermore, the machine is equipped with two planing tools. With the aid of a remote push-button control, the operator can control every movement of the machine from six panel stations. The American agent is U. Kauermann, Fountain Square Bldg., Cincinnati, Ohio.

### Milling Machine, Manufacturing, No. 5

*DeVlieg Machine Tool Co., Jackson, Mich.* (Vol.76,p.1111.)

Positioning of the head for distance between center of spindle to top of table and locking is automatic. All functions of this machine are operated electrically. Six standard line-start motors, one for each unit, provide driving means. Eight speeds, from 18 to 250 r.p.m.,

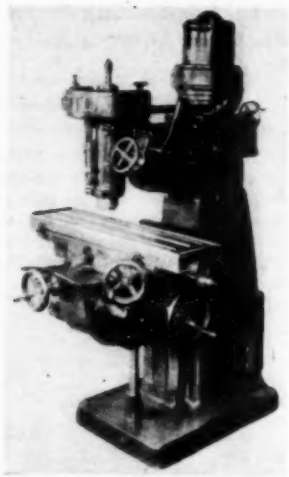
are furnished to the spindle. Table feeds range from 0.8 to 32 in. per min. in 16 steps. Rapid traverse is 250 in. per min. Both are operative in either direction.

Range: Center of spindle to top of table: max., 20 in.; center of spindle to top of table, min., 3 in.; quill adjustment, 5 in.; table feed (standard), 60 in.; width between spindle head and braces, 29 in.; working surface, 22x90 in.

### Milling Machine, Universal, No. 8-D

*George Gorton Machine Co., Racine, Wis.* (Vol.76,p.1114.)

The universal head is designed for running cutters at high speeds on tool, die, mold and metal pattern work. Both

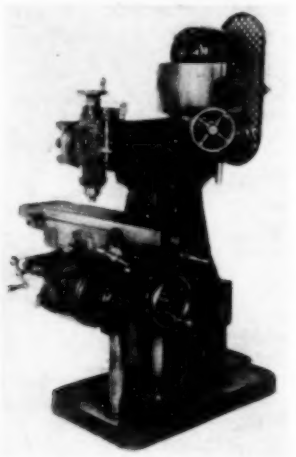


heads swivel 360 deg. The sliding head is adjusted in and out by a rack and pinion. Spindle speeds, up to 1,800 r.p.m. The machine will run a ½-in. high-speed steel end-mill to capacity. Table longitudinal feed, 20 in.; table cross feed, 10 in.; sliding head movement, 10 in.; vertical feed of knee, 13¾ in.

### Milling Machine, Vertical, No. 9-J

*George Gorton Machine Co., Racine, Wis.* (Vol.76,p.1143.)

Designed to run small cutters at high speeds on tool, die and mold work, the No. 9-J vertical milling machine drives to capacity high-speed steel cutters from $\frac{1}{16}$ to 2 in. Sliding head, which carries the spindle and drive complete, can be quickly adjusted in or out, doubling the



area covered at one setting of the work. Spindle speeds range from 250 to 4,000 r.p.m. in 20 steps. The spindle has a No. 10 B&S taper. Table longitudinal feed, 24 in.; cross feed, 12 in.; sliding head movement in and out, 14 in., vertical feed of knee, 14 in.

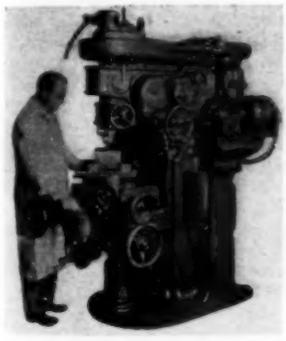
An optional feature is the power or hand feed to the table. A power-feed knee can be furnished or a plain knee substituted without affecting other parts of the machine. Feeds of the former are 4/10 to 30 in. per min.

### Die-Sinking Machine, Universal, No. 2A

*Pratt & Whitney Co., Hartford, Conn.* (Vol.76,p.1109.)

Standard die-sinking tools only are used for either straight or cherrying cuts. Either the cutter can be moved through a circular path, using the the oscillating head set at any required diameter, or the entire head can be locked and the machine used for rectangular cutting. The operating head is equipped with power feed by a separate motor.

The table travels in two directions and carries a rotary vise



mechanism. Micrometer rings and binders are provided on all slides. Maximum distance from the vise to the end of the spindle is 17½ in. Vertical travel of the knee is 16 in.; travel of the spindle quill, 2½ in. Distance from the column face to the center of the spindle is 21 in. Longitudinal and transverse movements of the table are 12 in. each. The vise will take a block up to 9x10 in. Eight spindle speeds range from 300 to 3,600 r.p.m. The head can be revolved through circles having diameters from 0 to 3½ in.

### Profiling and Die-Cutting Machine, No. 3-K, "Matrix"

*George Gorton Machine Co., Racine, Wis.* (Vol.76,p.1176.)

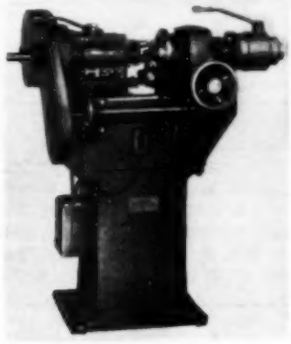
Designed for production of steel stamps and designs, sunk or in relief, and on either flat or curved surfaces, the No. 3-K "Matrix" is also suitable for production profiling of small parts held to close limits, and for small intricate duplicate dies and templets. In addition to ball bearings for the cutterhead and

link, ball bearing slides grip the head directly above the cutter. A quick-removable spindle permits grinding cutters while in place in the spindle. Specifications: Table longitudinal feed, 12 in.; cross feed, 8¾ in.; vertical feed, 10¼ in.

### Milling or Routing Machine, Horizontal

*Reed-Prentice Corp., Worcester, Mass.* (Vol.76,p.951.) 57.

The horizontal milling or routing machine is adapted for work of the interrupted groove type, and for rapid production



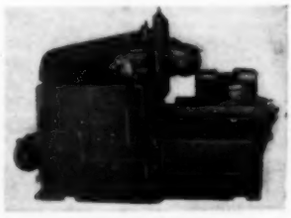
on work of different diameters. The machine has a power-driven head and spindle. The latter has a collet chuck. Automatic feed is provided to the rotary head.

Speeds of 4,000, 4,500, 5,500 or 6,000 r.p.m. may be secured from the cutter spindle which runs continuously. The spindle is operated by a lever and is brought to the proper depth of cut by micrometer adjustment. Rotary feed for the workholding fixture is engaged by a plunger-type lever. The spindle is automatically withdrawn from the cut.

### Milling Machine, Cam-Type, No. 42

*Producto Machine Co., Bridgeport, Conn.* (Vol.76,p.1110.) 162.

Intended for short milling cuts in a straight or curved path, the No. 42 can be changed over quickly for short-run or long-run jobs by the use of simple, inexpensive fixtures. Improvements are: a drum cam which controls all functions automatically, and of which the removable cam strips can be changed quickly for different jobs; a two-station type of work fixture table that indexes automatically 180 deg.; vertical as

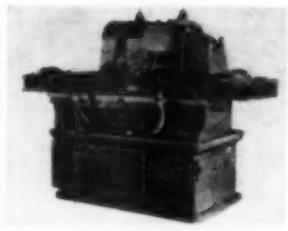


well as horizontal stroke of the cutters to provide an angular or curved cut; large shaper-type ram; cutter speeds from 30 to 1,400 r.p.m. Cutter spindle slide has a vertical travel of 12 in., but the actual travel during milling is only 2 in. Cutters up to 13 in. can be used.

### Milling Machine, Cam-Type, No. 120

*Producto Machine Co., Bridgeport, Conn.* (Vol.76,p.1239.) 261.

A table traveling horizontally and automatically and cutter heads traveling vertically and automatically are combined in the No. 120 "Producto-Matic." Two columns and two cutter heads are used. Two sets of parts are alternately milled, the machine working at one end of the table and the operator loading and unloading at the other



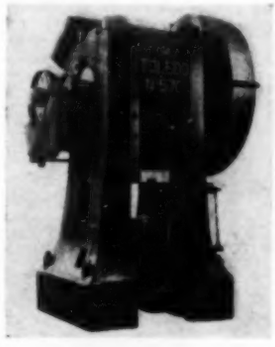
end. One cutter feeds down, the table feeds, the cutter rises out of the cut automatically, the table moves to the second station, the second head descends, the table feeds to the end of the cut, the second cutter head rises and the table returns to the original position. An example of use is for keyways in axle shafts. The table is 76 in. long by 18 in. wide. The feed mechanism provides horizontal movement of the table of 8 in. for each group of parts and a vertical travel of 4 in. for the cutters.

## Presses

### Presses, Heavy-Duty

*Toledo Machine & Tool Co., Toledo, O.* (Vol.76,p.953.) 54.

The frame is a single steel casting of heavy cross-section reinforced by four extra-large tierods shrunk in place. The crankshaft is of the full eccentric type and is of large diameter. There is no adjustment in the steel connection. A wedge adjustment is provided under

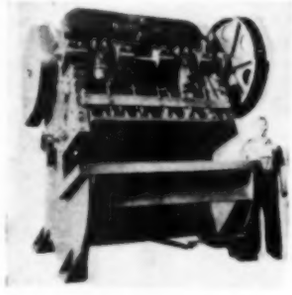


the bolster. The slide is a steel casting guided in the front by bronze-faced gibs. The press is arranged for receiving a lower cam-actuated knockout and an upper knockout. Single gearing is used so that the press may be operated at a high speed.

### Press, Double-Crank, No. 25½

*Henry & Wright Mfg. Co., Hartford, Conn.* (Vol.76,p.840.) 7.

This machine is inclined in a fixed position of 25 deg. from the vertical so that large blanks will slide by gravity to a conveyor at the rear. The frame,



slide and main gear are of welded-steel construction. The crankshaft is mounted in bronze-bushed bearings. Drive shaft is equipped with Timken roller bearings. Automatic pressure lubrication is supplied to principal bearings.

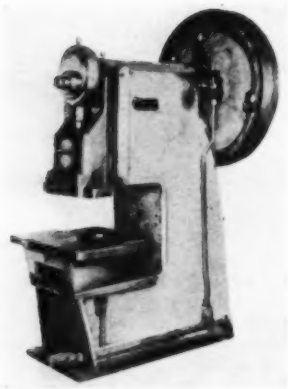
Dimensions: opening, 72 in.; area of bed, 30x85 in.; opening in bed, 15x56 in.; area of slide face, 24x66½ in.; shut height, 15½ in.; thickness of bolster, 3½ in.; stroke, 4 in.; number of strokes per minute, 35; weight, 30,000 lb.

### Press, Punch, Deep-Throat

*Service Machine Co., 750-760 Broadway, Elizabeth, N. J.* (Vol.76,p.1143.) 156.

Known as the P-27½, this machine operates at 125 r.p.m. as a maximum, and is designed particularly for heavy punching and stamping operations. The deep-throat design permits handling of work of large area. A bolster adapter is regularly provided.

The slide bottom face has a hole for 3-in. shanks. Two different centers are provided, the regular shank center giving

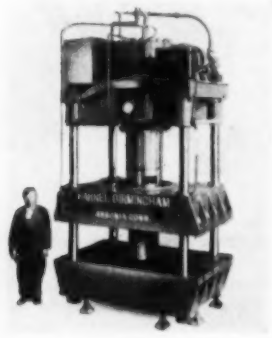


depth of throat of 18¼ in., and the front extension center giving a depth of throat of 20¼ in. Any stroke up to a maximum of 4 in. can be provided. Shut height above the bolster adapter ranges from 5½ to 9 in. Bolster area, 32x25 in.

### Press, Hydraulic, 200-Ton

*Farrel-Birmingham Co., Ansonia, Conn.* (Vol.76,p.1176)

This press has a 24-in. ram having a 24-in. stroke. The single cylinder is of the double-acting type. The 49½- by 80-in. moving platen is made of special



alloy iron. Oil supply is contained in a welded steel tank. Pressure on the ram is adjustable by means of quick-resetting relief valves. All movements are controlled by a pendant switch.

### Drawing Device, "Simplex"

*Rockford Iron Works, Rockford, Ill.* (Vol.76,p.922.) 36.

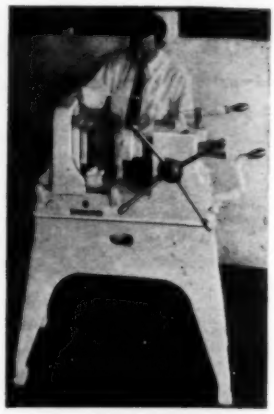
Attached to a single-action press, the "Simplex" drawing device is said to permit production of deep-drawn stampings equal to those produced in a double-action press. Two pinions co-act on the double center rack attached to the spindle on which the center block is mounted, and as the draw ring is depressed the center block moves upward at the same relative speed, thus balancing the pressure on the draw ring and the center block. Eight sizes cover draws from 3 to 6 in.

### Press Guard, Triple-Interlock

*Wuest Bros., 930-936 West Hill St., Louisville, Ky.* (Vol. 76,p.1078.) 128.

When the pedal is depressed, the guard, which is light and cushioned, is automatically unlocked and falls by gravity. Operation of the guard is 180 deg. ahead of the ram. At

each operation, the pedal rod is automatically brought back to the locked position and, at the same time, the clutch dog on the press itself is brought back into release position and the press cannot repeat its operation unless the guard has dropped into a safe position. The operator cannot ride the pedal, which is claimed to cause 75 per cent of accidents.



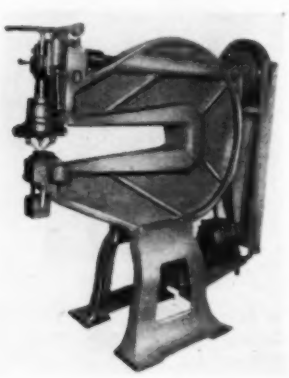
The stationary die half is mounted on the head platen. The ram carries the movable die half up to the stationary die-head when the spoked wheel is rotated. When the dies are closed the metal well is automatically raised to the casting position. Core pulling is accomplished automatically with the opening and the closing of the dies. It requires 15 seconds to complete a machine cycle. Castings are automatically ejected from the die.

## Other Machines

### Cutter, Metal, 36-In.

*Gray Machine Co., Box 596, Philadelphia, Pa.* (Vol.76,p. 1175.) 208.

This shear has a 36-in. throat and ⅜-in. capacity. It also has a patented revolving turret head that permits cuts to be made in all directions in a sheet. Cut-



ting speeds can be changed from 550 r.p.m. in maximum stock to 1,200 r.p.m. in light stock. The cut can be made to a scribed line.

### Cut-Off Machine, Abrasive

*Tannewitz Works, Grand Rapids, Mich.* (Vol.76,p.1209.)

A high-speed abrasive cut-off machine for cutting metal moldings, tubing and small bars, this machine is made in two sizes,

the smaller taking 7½ hp.; the larger 15 hp. The spindle runs at 5,500 r.p.m. The circular table swivels from 45 deg. left to 45 deg. right. Hold-downs are placed on both sides of the work, and are treadle operated.

### Die-Casting Machine, No. 11, "Kipp-Caster"

*Madison-Kipp Corp., 201 Waubesa St., Madison, Wis.* (Vol.76,p.984.) 84.

Features of this machine are: Its small size its ability to handle all common die-casting alloys, including magnesium; its quick die-changing arrangement; its convertibility into a permanent mold machine for casting brass; and its simple operation.

### Engraving Machine, Roll, No. 3-R

*George Gorton Machine Co., Racine, Wis.* (Vol.76,p.1174.)

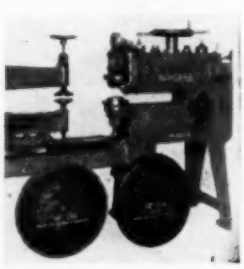
For cutting lettering and designs, either sunk or in relief, on rubber, brass, copper and steel printing and embossing rolls, the machine will handle all sizes from the smallest diam-

eter and shortest face up to a maximum of 30 in. in diameter by 12½-ft. face. The machine operates in a similar manner to Gorton pantograph machines. An indexing fixture is supplied.

### Flanging Rolls, Special

*Niagara Machine & Tool Works, Buffalo, N. Y.* (Vol. 76,p.1211.) 245.

Special flanging rolls are offered for the production of the standard type of double recessed heads, flanged for double seaming. These heads are used for double-seamed containers. One set of rolls will produce heads

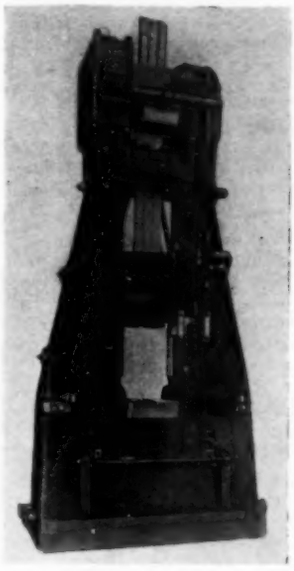


over a large diameter range when made by the flanging method, by simply adjusting the position of the circle arm of the flanging machine.

### Hammer, Board-Drop, Variable-Stroke

*Erie Foundry Co., Erie, Pa.* (Vol.76,p.1018.) 70.

A light or heavy blow, a short or long stroke, can be chosen at will by the operator for the variable-stroke board drop hammer. The hammer is treadled in the usual manner

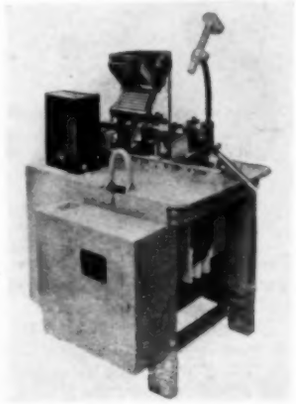


with one foot, and the length of the stroke is governed by a slight rocking of the foot on the treadle. The construction is simple, costs slightly more than the ordinary design, and can be applied to existing hammers.

### Metal Heaters, Electric, "Berwick"

*American Car & Foundry Co., 30 Church St., New York, N. Y.* (Vol.76,p.1243.) 266.

Through a photo-electric control, bar stock for forging and rivets are heated to within 20 deg. of the desired temperature. Shown is a forging heater for heating any diameter stock from

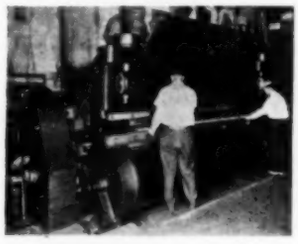


$\frac{1}{4}$ to 2 in., where the stock is cut to any length from 3 in. up to 12 in. The heat may be localized. The heater can be built with from 1 to 5 electrodes.

### Press Brake, Welded-Steel, "Rafter"

*Farrel-Birmingham Co., Inc., Ansonia, Conn.* (Vol.76,p.1080.)

Welded construction is now used for the deep ram and bed of the Rafter press brake. Gear casings and housings for eccentric and gear shaft bearings are welded integrally with the bed.

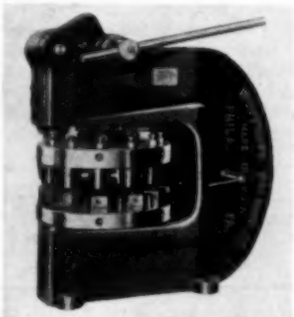


There is no driving mechanism on the upper part of the machine; it is attached to or contained within the bed. The feature of operation is that the ram is pulled from below instead of pushing it from above.

### Punch, Turret, 12-In. Throat

*Wiedemann Machine Co., 1815-31 Sedgley Ave., Philadelphia, Pa.* (Vol.76,p.838.) 9.

Greater throat depth and a new type lever mechanism are embodied in the 12-in. throat turret punch. This bench machine has twelve punches and dies up to 1-in. diameter mounted in a revolving turret.



A positive indexing device locks the revolving turret when the punch and die selected for use are located centrally under the ram. Capacity of the machine is 15,000 lb. pressure and it will punch holes up to $\frac{3}{4}$ in. in $\frac{1}{4}$ in. machine steel or up to 1 in. in $\frac{1}{8}$-in. machine steel.

### Riveting Machine, Rotary, No. 1-A

*Grant Mfg. & Machine Co., Bridgeport, Conn.* (Vol.76,p. 1240.) 161.

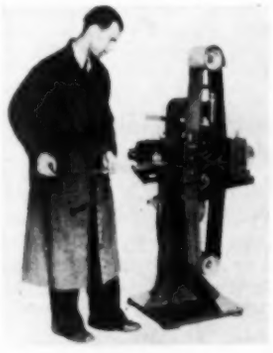
The No. 1-A is made in the bench model or can be mounted

on a pedestal. It drives $\frac{1}{16}$ to 5/30 in. rivets cold. The motor is mounted at the back on an adjustable bracket to take up stretch in the V-belt drive. Three speeds of operation are secured. Gap is $3\frac{1}{2}$ in. and depth between the tool and the table can be adjusted to 14 in. Flat or horn tables can be had.

### Sander and Grinder, Power-Feed

*Porter - Cable - Hutchinson Corp., Syracuse, N. Y.* (Vol. 76,p.921.) 21.

Sanding and grinding both sides of parallel work in one direction is the function of the power-feed, double-belt sander and grinder, Type DB. The operation consists of feeding the



work through by means of power-feed rollers. Two belt speeds are obtainable from the V-belt drive. Maximum thickness through the feed rolls is 1 in. Adjustment up to $\frac{1}{4}$ in. is secured. Work from zero to $\frac{1}{2}$ in. or $\frac{1}{2}$ to 1 in. thick may be handled.

### Sander, Belt, No. 298

*Oliver Machinery Co., Grand Rapids, Mich.* (Vol.76,p.1173.)

The No. 298 belt sander is suitable for grinding and polishing bronze tablets, aluminum and brass castings, as well as all kinds of woodwork. Flat work up to 46 in. long and 26 in. wide can be supported di-

rectly on the table and sanded or polished at one setting. The table lowers to accommodate work 9 in. high. Belts up to 5 in. wide can be used.

### Shaper, Draw-Cut, 60-In. Stroke

*Morton Mfg. Co., Broadway & Hoyt St., Muskegon Hts., Mich.* (Vol.76,p.1019.) 76.

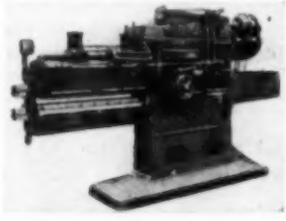
The special head has motor-driven rapid traverse and 14 in. of vertical feed. The shaper has 60 in. of stroke, 60 in. of horizontal or side feed, and 27 in. of vertical feed. Distance between the ram and the sub-

table is 38 in. The shaper is of the four-screw type for handling heavy and bulky castings. It has rapid power traverse, both horizontal and vertical, and also automatic feeds which can be changed while the machine is in motion. It requires 15 hp.

### Trimming Machines, Flash, Draw-Cut

*Morton Mfg. Co., Broadway & Hoyt St., Muskegon Hts., Mich.* (Vol.76,p.918.) 32.

Built for removal of flash or upset on steel barrels or butt-welded sheets or plates, this line of draw-cut flash trimming machines has two rams for removing flash from both sides

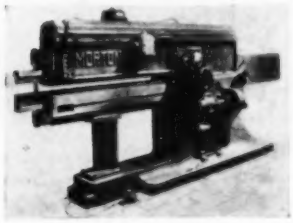


simultaneously. The rams carry a multiple number of cutting tools which are readily adjustable for height. Straightening rollers precede the cutting tools. One machine has 40-in. stroke; another, 72 in. Upper arm raises 2 in. to remove work.

### Trimming Machine, Flash, Draw-Cut

*Morton Mfg. Co., Musgekon Heights, Mich.* (Vol.76,p.1173.)

Designed for trimming strips, sheets or plates, particularly in the form of automobile fenders and special shapes, this flash trimming has a 48-in. cutting

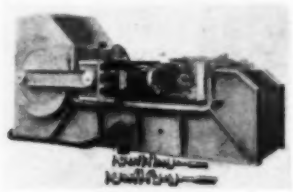


stroke. The machine is entirely electrically controlled, and compressed air is not required for clamping the work while trimming. Trimming is done on the inward stroke of the ram only. Distance between the clamping jaws and the cutters when the upper ram is raised is approximately 2 in.

### Twisting Machine, Crankshaft, "Steelweld"

*Steelweld Machinery Co., E. 70th & Machinery Ave., Cleveland, O.* (Vol.76,p.1177.) 220.

Machine twists crankshafts for very small 4's, up to 72 in. long and as large in bearing diameter as desired in 1 min. Arranged to make four twists



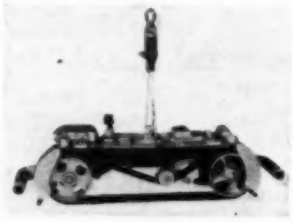
at one time, but eight or more twists can be made simultaneously. All pins are held to commercial limits and the main bearings held in line. The unit carries double rams operating independently. Drive is by a 35-hp. motor. Frame, rams, side arms and gearing are of welded-steel construction.

type, and roller floor-stand Type FJB. Motor is a ½-hp., ball bearing. Speeds are 1,000, 2,000, 4,000 and 7,000 r.p.m. Flexible shaft is 42 in. long.

### Sanders and Grinders, High-Frequency

*Buckeye Portable Tool Co., Dayton, O.* (Vol.76,p.1079.) 130.

A special high-frequency motor is used. The high-frequency belt sander, Model No. 352-E, is used for smoothing welds, large steel dies, finishing metal, wood and stone surfaces. Cup wheel grinder, Model No. 382-E, is used on welded seams and for surfacing large castings.



### Screwdriver, "Rightway"

*Foster Machine Co., Elkhart, Ind.* (Vol.76,p.842.) 1.

This flexible-shaft type of screw, nut and stud setter may be suspended from a yoke or placed on a pedestal. The socket end of the flexible shaft is provided with push-button control so that the 220- or 440-volt, a.c. polyphase motor may be disconnected after the stud or nut is driven home. Where the driving device must be mounted directly above the work, a telescoping sleeve is furnished.

### Screwdriver and Nut Setter

*Chas. L. Jarvis Co., Gildersleeve, Conn.* (Vol.76,p.1083.) 138.

For driving screws and setting nuts up to ¼ in., the tool is of the flexible-shaft type. Specifications: motor ¼ hp., ball bearing, 1,750 r.p.m.; flexible shaft, ⅜ in., 36 in. long. Driving force is adjustable.

## Portable Tools

### Bushing Truer, Triple-Valve

*Whiting Corp., Harvey, Ill.* (Vol.76,p.919.) 45.

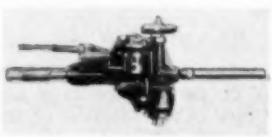
Maintenance of air brakes is the function of the motor-operated triple-valve bushing truer. Floor-to-floor time is 1½ min.

One adjustable jaw holds the cutting tool which is tipped with tungsten-carbide. A holding fixture goes with this machine.

### Drill and Reamer, Portable

*Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.* (Vol.76,p.1242.) 263.

The offset motor is separate from the frame and feed screw post to afford a short, sturdy machine and a feed of greater range. The switch handle is of the safety-roll type, and has no



openings to permit dust or dirt to enter. The tool is made in five sizes, drilling capacities ranging from ⅜ to 1¾ in., and reaming capacities from ⅛ to 1¼ in.

### Grinder, Portable, High-Speed

*Millers Falls Co., Greenfield, Mass.* (Vol.76,p.1242.) 262.

A totally inclosed motor is used in the No. 461 high-speed portable grinder. Oversize ball bearings are of the improved

grease-seal type. Gears are of chrome-nickel steel, heat-treated. No-load spindle speed is 5,500 r.p.m., and bakelite or rubber bonded wheels must be used. The tool weighs 24 lb.

### Flexible-Shaft Machine

*Chas. L. Jarvis Co., Gildersleeve, Conn.* (Vol.76,p.1078.) 136.

The "Multi-Jarvis" flexible-shaft machine is available in the Type FJA bench model. Type FJC overhead trolley

## Small Tools

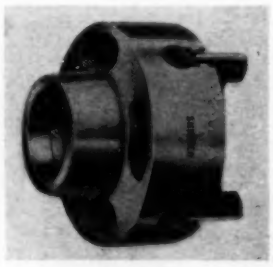
### Abrasive Bands

*Torit Mfg. Co., 174 W. Third St., St. Paul, Minn.* (Vol.76, p.985.) 75.

The abrasive band is put over the rubber wheels which are then expanded to tighten the band. The rubber wheel provides the band with a soft cushion, which is of value when various buffing and polishing operations are being done. The wheels and bands range from ½ to 2 in. wide.

### Chucks, Lathe

*Hardinge Bros., Inc., Elmira, N. Y.* (Vol.76,p.919.) 26.

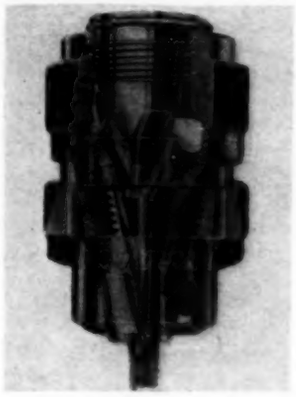


These chucks for bench lathes do away with the usual "screw-and-plate" mounting. The chucks are mounted on "Cataract" cone nose live spindles and the jaws are ground for accuracy on all gripping surfaces.

## Chuck, Tap

*Jacobs Mfg. Co., Hartford, Conn.* (Vol.76,p.982.) 79.

In this positive drive tap the front jaws hold the tap by the shank, and the back jaws drive the tap by the square, but the floating construction corrects error in the concentricity be-



tween the shank and the square on the tap. Arbor holes are interchangeable with standard Jacobs drill chucks. Largest size takes ½ in. taps.

## Chuck, Single-Purpose

*Jacobs Mfg. Co., Hartford, Conn.* (Vol.76,p.1050.) 81.

Designed for use on high-production machines where multiple spindles on close center distances require a chuck with minimum diameter but with

maximum gripping power, this chuck has a taper thread that provides gripping power, but also offers rapid and positive release. End adjustment of the tool is permitted.

## Crystals, Cutting and Hard Facing

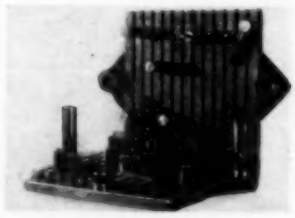
*Booth Engineering Co., Ltd., 15 Park Row, New York, N. Y.* (Vol.76,p.840.) 19.

Colmonoy crystals form the base of the nine products. Inserts consist of the crystals in a matrix of tungsten, and can be used on cutting tools. Hardness lies between nine and ten on Moh's scale. Granules range from 16 to 60 mesh and are applied to thin-edged tools by the oxyacetylene flame. Hard facing rods come in two types. Overlay compound is for carbon arc application only, giving an abrasion-resisting overlay.

## Die, Perforating

*S. B. Whistler & Sons, Inc., 752-754 Military Road, Buffalo, N. Y.* (Vol.76,p.1141.) 173.

This perforating die can be adjusted to pierce metal up to ⅛



in. thick in any arrangement or group of holes that may be desired. Relocation of the punches and dies can be effected, and all punches and dies may be replaced or changed while dies are in the press.

## Die, Opening, Hexagon

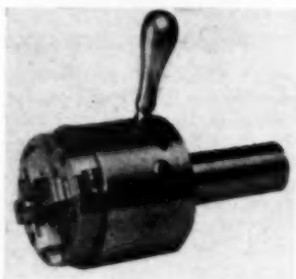
*Threadwell Tool Co., Greenfield, Mass.* (Vol.76,p.1238.)

The hexagon opening die can be removed without backing off. It is adjustable for tight or loose fits. One-half turn of the lock screw opens or closes the die. Screw sizes are ¼ to 1¼ in.

## Diehead, Style MS

*Eastern Machine Screw Corp., New Haven, Conn.* (Vol.76,p. 923.) 24.

Intended for hand turret lathes and similar machines where the diehead does not rotate, the Style MS diehead uses



insert chasers. The head is of the pull-off type. An adjustable work stop may be fastened in the shank.

## Diehead, Self-Opening, Type "R-C"

*Murchey Machine & Tool Co., Detroit, Mich.* (Vol.76,p.1050.)

This type "R-C" rotating diehead is made in sizes from ⅜ to 1¼ in., inclusive. It is equipped with circular chasers that are ground in the thread. The diehead is opened and closed automatically by means of a collar trip. These features make the tool suitable for use in multiple-spindle automatic

screw machines and second-operation machines. The four chaser holders may be removed with the fingers.

## Diehead, Circular-Chaser, "Namco"

*National Acme Co., 170 E. 131st St., Cleveland, Ohio.* (Vol.76,p.1238.) 249.

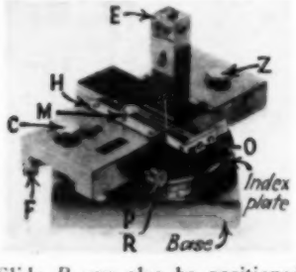
Type DBS "Namco" self-opening diehead with circular chasers is intended to fit Brown & Sharpe automatics. The circular forming tool principle enables the operator to secure better thread finish. Chasers are reset and reground in the toolroom, and the operator is

not required to make adjustments for length at the machine. The tool is arranged so that it closes automatically just before the threading operation in the threading position. Minimum cutting diameter is 0.053 in.

## Dresser, Grinding-Wheel, Radius

*Vinco Tool Co., 7350 Central Ave., Detroit, Mich.* (Vol.76, p.1115). 178.

Any angle can be dressed tangent to the radius on abrasive wheels. Slide *A* carries the diamond. Slide *B* can be set at desired angle and moved back and forth on the sine bar.




Slide *B* can also be positioned by stop *C*, so that diamond *E* is on center of pivot for dressing radius on wheel. Posts *M* and *O* are used to measure over with a micrometer.

## Dresser, Grinding-Wheel

*Carboloy Co., Inc., 2481 E. Grand Blvd., Detroit, Mich.* (Vol.76,p.1146). 191.

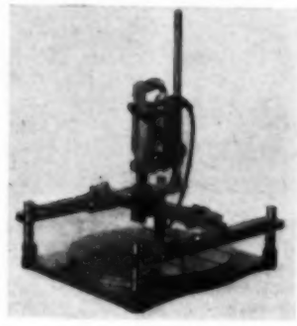
This tool fits all standard holders. It has a matrix im-

pregnated with small, crushed diamonds. Range of wheel sizes and types on which the tool has been used covers wheels up to 36 in. in diameter by 2 in. wide and to "M" in hardness.

## Drilling and Layout Fixture

*Reed-Prentice Corp., Worcester, Mass.* (Vol.76,p.1049.) 98.

A universal fixture for laying out work as well as drilling holes up to ½ in. is made in two sizes, one with a 12-in. rotary table, and the other with a 20-in. rotary table. Standard height under the crossbar on

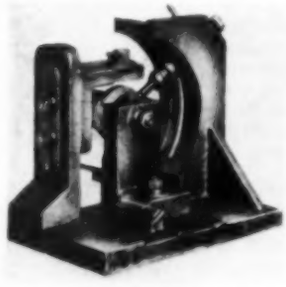


the 12-in. size is 10 in.; on the 20-in. size, 12 in. The table is graduated in minutes. The crossbar as well as the longitudinal bar is arranged so that end measures with micrometers can be used for spacing in either direction.

## Drilling Fixture, Ring, Universal

*Reed-Prentice Corp., Worcester, Mass.* (Vol.76,p.1017). 99.

For drilling holes on the outside diameter of adjusting collars, the universal ring drilling fixture has capacity as follows: 1½ in. diameter minimum, 6 in.



maximum. Holes can be drilled to the center of a 6-in. width of maximum size rings. Holes from ½ to ⅝ in. can be drilled.

### End Mill, Double-Ended "Wel-Don"

*Weldon Tool Co., 1426 W. Third St., Cleveland, O.* (Vol. 76,p.1147). 196.

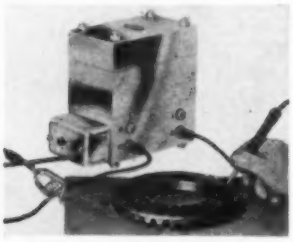
For rapid production of keyways, a special form of end mill has been designed. This tool has cutting edges at the ends

as well as at the sides and has no center hole. It can be fed downward like a drill as well as horizontally.

### Etching Apparatus

*Luma Electric Co., P. O. Box 132, Toledo, O.* (Vol.76,p.1239.)

Twenty-four steps of heat regulation permit from extra light to extra heavy and deep marking. The Etchtool is designed for continuous production work, and two marking pencils can be attached. The



extra heavy stage is so hot that it will fuse ¼-in. bar stock and thus can be used for soldering and spot annealing. The outfit operates on 110 or 220 volts, 60 cycles.

### Gun, Spray, Metal

*Metal Spray Co., 113 Llewellyn St., Los Angeles, Calif.* (Vol.76,p.1146). 200.

For spraying various metals to build up machine parts or provide corrosion-resistant coatings, this improved gun has the air turbine and reducing gears inclosed in a separate aluminum case, and the wire-feeding

wheels, gas mixing chamber and nozzle as separate units. The gun operates at from 10 to 20 lb. acetylene pressure, 15 to 25 lb. oxygen pressure, and 80 to 90 lb. air pressure.

### Guns, Spray, Paint

*Alexander Milburn Co., 1416-1428 W. Baltimore St., Baltimore, Md.* (Vol.76,p.1176). 223.

Type M (illustrated) is for large industrial and automotive work, and the Type N for fine touch-up and high lighting. Body of the gun is made of

aluminum alloy. Passages for air or fluid are all straight to eliminate clogging. The Type M weighs 1¼ lb.; the Type N, ½ lb.

### Spray Head for Porcelain

*DeVilbiss Co., Toledo, O.* (Vol.76,p.922.) 40.

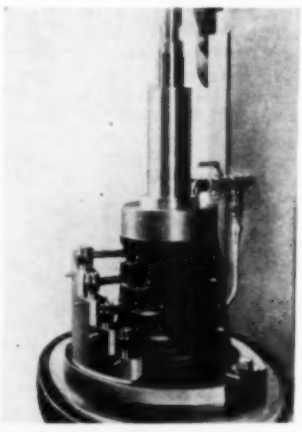
An assembly consisting of a spray head, air cap, fluid tip and fluid needle for the Type AV gun has been developed for

porcelain. The assembly gives a well-atomized spray about 9 in. wide when the gun is held 10 to 12 in. from the work.

### Honing Fixture, Automatic

*Micromatic Hone Corp., Dubois St. at Horton Ave., Detroit, Mich.* (Vol.76,p.1051). 120.

The work is floated while the tool is piloted, and at the same time a number of pieces are honed simultaneously. Each piece of work floats independently so that there is no effect from accumulated error of previous ma-



chining operations. The pieces are centered and held in alignment on resilient wiper guides which are mounted in the body of the honing tool.

### Self-Centering Device for Lathes

*Wm. Carroll & Son, 1776 Lexington Ave. (Norwood), Cincinnati, O.* (Vol.76,p.1242.)

All sizes from 0 to 2 in. can

be centered. The driver has a No. 3 Morse taper, and the centering device a No. 3 Morse taper. Center drills are of standard sizes.

### Tap, Stub, with Square Shanks

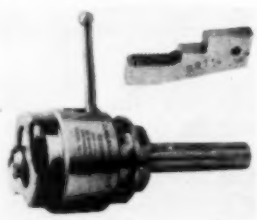
*Greenfield Tap & Die Corp., Greenfield, Mass.* (Vol.76,p. 923.) 20.

"Stub" taps with a square on the end instead of with a plain round shank make the taps available for use in all automatic tapping machines. Stub taps are supplied in machine screw sizes.

### Tap, Collapsing, Class SL

*Geometric Tool Co., New Haven, Conn.* (Vol.76,p.113.) 146.

For small hole tapping, the Class SL collapsing tap can be used in live spindles or in stationary holders. It may be operated as a plate trip tap or a spool trip tap and may be



reset by the handle or by a fork riding in the spool section of the closing sleeve. It may be used as a lever trip tap. The chaser is rigidly supported for its entire length. Tap is adjustable for size. Capacity, 1 to 1⅜ in.

### Tool Manufacturing Kit, Carbide

*Carboloy Co., Inc., Detroit, Mich.* (Vol.76,p.1238.) 254.

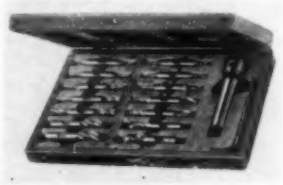
Tools tipped with tungsten carbide can be made up as required. The standard kit con-

tains brazing and cleaning materials and an assortment of Carboloy tips and shanks. Tool sizes are ⅜ in. sq. x 2½ in.; ½ in. sq. x 3½ in.; ⅝ in. sq. x 4 in.; and ⅝ x 1¼ x 8 in.

### Tool Kit, End-Mill

*Weldon Tool Co., 1426 W. Third St., Cleveland, O.* (Vol. 76,p.1238.) 253.

The "Wel-Don" toolroom kit No. 1 preserves end-mills from loss and damage. It contains a complete set of end-mills, both

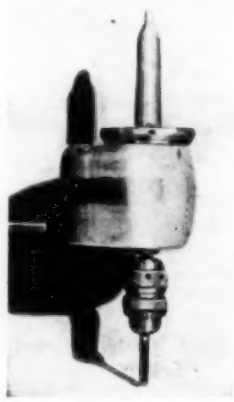


roughers and finishers, from ⅛ to ½ in. End-mills from ⅛ to ⅜ in. inclusive are of the double-ended type.

### Tapping Attachment, No. 0, Biax

*Chas. L. Jarvis Co., Gildersleeve, Conn.* (Vol.76,p.1143.)

Attachment operates at 3,500 r.p.m., drives taps from No. 2-56 to ¼ in. in steel, is equipped with ball bearings and has Tex-



tolite, self-adjusting clutches. It is also equipped with reverse at double speed and double friction. Gears are of chrome-nickel steel.

### Vise, Drill

*Modern Machine Tool Co., Jackson, Mich.* (Vol.76,p.1050.)

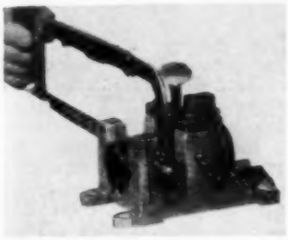
This all-steel combination drill table and vise is a smaller size and is constructed of plates and angles, welded and machined. It is available in three sizes, with 6, 7 and 8-in. square tables that open from 4 to 4½ in. All vises are 1 in. deep.

# Gaging, Measuring and Testing Equipment

### Vise, Square-End Sawing

*Borden Co., Warren, O.* (Vol.76,p.1208.) 228.

For cutting square ends on thin-wall copper or brass tubing, the Beaver square-end sawing vise takes tubing from

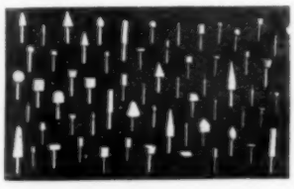


¼ to 2 in. The vise is made of aluminum. A long V-trough insures accurate centering.

### Wheels and Points

*Norton Co., Worcester, Mass.* (Vol.76,p.841.) 8.

Wheels, points, pencils, buttons and other shapes have been placed on the market, the line including 100 different shapes which can be used on standard machines. They range from points ⅛ in. in diameter to wheels 1 in. in diameter. Most

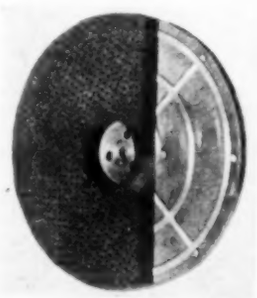


of the products are made of 38 Alundum abrasive, developed expressly for tool and die work. The spindle is made of special steel first copper and then nickel plated. It is knurled and designed with a chisel end to insure permanent anchoring of the abrasive on the quill.

### Grinding Wheel, Perforated, "Steelbac"

*Chas. H. Besly & Co., 118 N. Clinton St., Chicago, Ill.* (Vol. 76,p.1147.) 193.

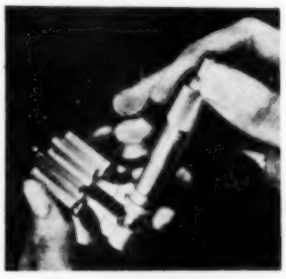
To provide clearance and to give the grindings an opportunity to escape, perforations are provided in the face of the "Titon Steelbac" grinding wheel. The holes extend almost to the steel backing. Perforated Steelbacs are 1, 2 and 3 in. thick and can be worn down to the plate.



### Caliper, Inside-Micrometer, No. 700

*L. S. Starrett Co., Athol, Mass.* (Vol.76,p.1175.) 206.

Dimensions between 0.200 and 1 in. can be measured directly in thousandths. The micrometer combines the sliding jaws of a slide caliper and the easy read-



ing thimble and sleeve arrangement of a micrometer caliper. One jaw is fixed and the other is attached to the sleeve.

### Gages, Thickness

*Brown & Sharpe Mfg. Co., Providence, R. I.* (Vol.76,p. 919.) 29.

Two thickness gages, Nos. 645 and 647, have tapered blades 3 in. long and ½ in. wide at the tip. No. 645 has nine blades varying in thickness from 0.0015 to 0.015 in. No. 647 has 26 blades varying in thickness from 0.0015 to 0.0025 in.

### Gage Blocks, Precision

*Webber Gage Co., 2517 Vestry Ave., Cleveland, O.* (Vol. 76,p.1146.) 195.

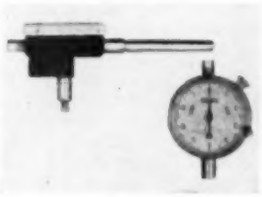
Guaranteed to be within 8 millionths of an inch of the marked size, these precision gage blocks are furnished in low-cost sets. Set No. 81B has a range from 0.100 in. to 12.000

in. Set No. 5B has a range from 0.100 in. to 2 in. by 0.100 in. increments. Set. No. 35B has a range from 0.100 in. to 5.0000 in.

### Indicator, Dial, Model 82

*Federal Products Corp., 1144 Eddy St., Providence, R. I.* (Vol.76,p.1145.) 172.

A dial indicator graduated in ten-thousandths, and having a spindle operating through the center of the back instead of through the side of the case, is



known as the Model 82, and has a range of 0.020 in. The dial can be furnished with calibrations of either 0-5-0 or 0-10.

### Micrometer, Light-Wave

*Van Keuren Co., 12 Copeland St., Watertown, Boston, Mass.* (Vol.76,p.920.) 35.

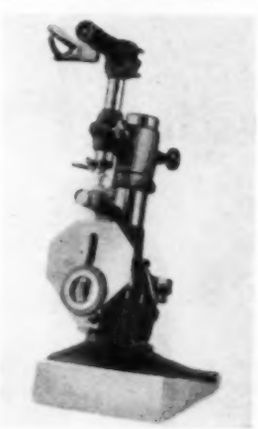
An accurate bench micrometer, the instrument has a 6-in. measuring wheel graduated in 0.0001 in., permitting readings of 0.0001 in. An optical flat is held in contact with a 3-in. steel

flat with spring pressure and is connected by a tension rod to the arm supporting the micrometer head. Bending of the arm is detected by movement of the light-wave interference bands.

### Attachment for Zeiss Optimeter

*George Scherr Co., 128 Lafayette St., New York, N. Y.* (Vol.76,p.983.) 83.

Measurement of bores from ¼ to 4 in. to within 0.00005 in. accuracy can be done with an adjustable internal attachment, which is now available for the Zeiss vertical optimeter,

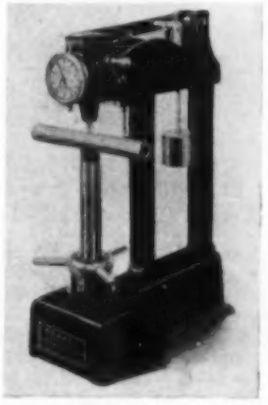


an optical precision amplifying gage. Means are also provided for determining taper and for finding both minimum and maximum diameter of the bore. The attachment slips over the vertical post of the optimeter.

### Hardness Tester, Superficial, Rockwell

*Wilson Mechanical Instrument Co., 383 Concord Ave., New York, N. Y.* (Vol.76,p. 987.) 72.

A special-purpose hardness tester, functioning on the Rockwell principle, but not making standard Rockwell hardness tests, is now offered for testing nitrided steel and sheet metal

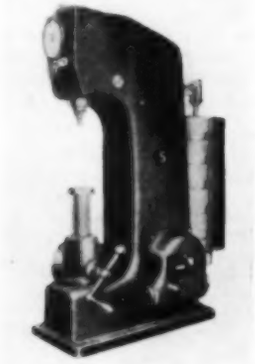


thinner than the standard Rockwell is capable of handling. It operates with lighter minor and major loads and a more sensitive depth measuring system. A penetration test in a nitrided specimen must avoid influence of the under-lying core.

### Hardness Tester, Brinell

*Steel City Testing Laboratory, 8843 Livernois Ave., Detroit, Mich.* (Vol.76,p.1115.)

Model UK-300 motor-driven Brinell hardness tester with push-button control employs the dead weight system of applying the load and incorporates a depth measuring device which, in conjunction with a movable scale, permits hardness tests to be made and read without the use of a Brinell microscope. Vertical opening for specimens is 11½ in.



### Measuring Machine, Gear

*Fellows Gear Shaper Co., Springfield, Vt.* (Vol.76,p.920.)

Various elements of a gear tooth that can be checked on this machine are: involute profile or shape, circular pitch, pitch diameter and eccentricity; also the lead or corresponding helix angle on helical gears, guides, and the helically splined

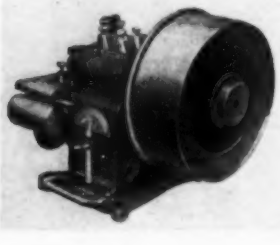
members. The column is positioned by gage blocks. Work is held on a vertical arbor. The fixture, which carries the dial indicator and the various inspection units, can be moved about on the table. This machine has a capacity for measuring gears from 2 to 7 in. pitch diameter.

### Measuring Instrument, Universal, Torsiograph and Vibrograph

*Baldwin - Southwark Corp., Southwark Foundry & Machine Co. Division, Philadelphia, Pa.* (Vol.76,p.1242.) 167.

The Lemag universal measuring machine is easily adapted to a variety of measurements, such as torsional vibration, or non-uniform angular velocity; recording of bending and deflectional oscillations, impacts, pressure actions, and relative motions of all kinds; static and dynamic elongations and stresses in machines. The Vibrograph serves for measuring and registering vibrations and oscillations over a wide range. One unit takes from 300 to 20,000 vibrations per minute and another from 1 to 700 vibrations per second.

The Torsiograph measures torsional vibrations, critical speed, oscillations, angular deviation, and torsional stresses, besides

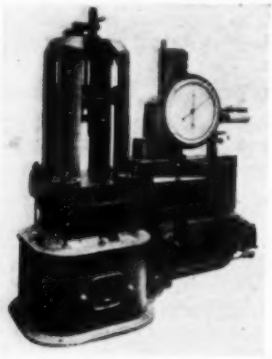


degree of irregularity of speed and registers all torsional fluctuations from 300 to 6,500 per minute.

### Testing Machine, Universal

*Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.* (Vol.76,p. 918.) 42.

An improved model of the four-screw, rotating gear nut type of universal testing machine has an eight-speed automotive gear-box producing cross head speeds of zero to 8 in. per minute. The self-indicating dial, a new feature, is not hydraulic,

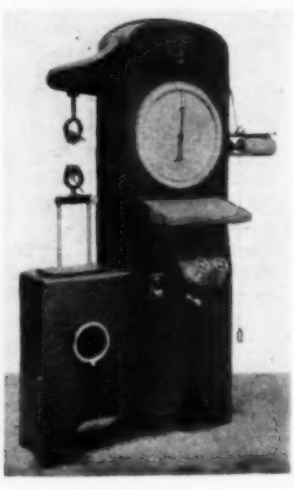


but is mechanically operated. The pointer may make two complete revolutions to capacity, enabling the operator to read small increments of load. The machine is also furnished with a hydraulic loading and lever weighing system.

### Testing Machine, Universal, Hydraulic

*Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.* (Vol.76,p. 1243.) 242.

Fine wire and strip steel are tested on this hydraulic universal machine, which is supplied with a self-indicating pendulum dial, a lever weighing system and a No. 3 recorder. The standard machine is furnished with dual capacity. Loading is accomplished either hydraulically or mechanically. For



the former system provision is made for constant speed of testing, regardless of load, up to the capacity of the machine. Clearance between grips of 0 to 10 in. may be secured. Travel of the pulling head in the hydraulic machine is 4 in.

### Testing Machine, Tensile

*Amthor Testing Instrument Co., Inc., 309 Johnson St., Brooklyn, N. Y.* (Vol.76,p. 1179.) 187.

No. 270 tensile strength testing machine has an 8½-in. dial and is graduated directly in

fractions of either pounds or kilograms. When the specimen breaks, the pointer remains at the breaking strength.

### Extensometer, Scratch

*Baldwin - Southwark Corp., Philadelphia, Pa.* (Vol.76,p. 1018.) 90.

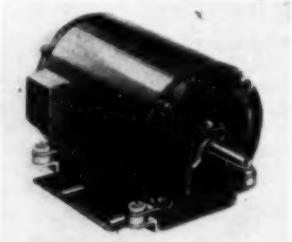
The device records tension-compression strains. A diamond is mounted under a small, but adjustable, load. The diamond bears on a steel target. Strain in the member causes the diamond to scratch a record on the target. Simultaneously the target is under a resultant force which causes it to move at right angles both to the axis of the instrument and to the axis of the diamond. Hence, one coordinate indicates strain, while the other affords a measure of the variability of the resultant transverse force and the amount and rate of strain variation.

## Electrical Equipment

### Motors, Capacitor

*Howell Electric Motors Co., Howell, Mich.* (Vol.76,p.1145.)

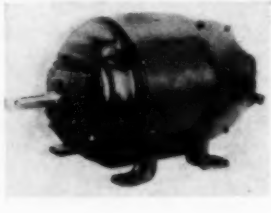
Horsepower ratings range from ⅛ to ½, full-load efficiency from 55 to 64 per cent and full-load power factor from 64 to 69 per cent. Starting torque is from 465 to 330 per cent of the full load torque.



### Motors, D.C.

*General Electric Co., Schenectady, N. Y.* (Vol.76,p.954.) 51.

These motors are so designed that many variations, such as different degrees of inclosure



for various applications, can be accomplished by using only a few different parts. Improved pulley end-shields afford maximum protection to the motor windings.

### Motors, Fractional-Horsepower

*Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.* (Vol. 76,p.955.) 64.

Frames, shafts, bearings and mounting arrangements are interchangeable, rating for rating. Five frame sizes suffice to serve the entire line, ranging in output from 1/30 to ¾ hp. Types included in redesign are: split phase, capacitor, repulsion-induction, polyphase, direct-current and repulsion motors.

### Motors, Fractional-Horsepower

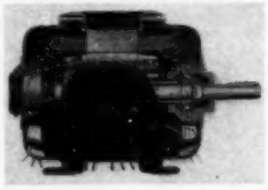
*Bodine Electric Co., 2264 W Ohio St., Chicago, Ill.* (Vol.76, p.986.) 73.

Available with or without worm gear speed reducers these motors range in output from 1/50 to 1/150 hp. Reduction ratios can be from 8½:1 to 1,120:1. The units are used for instruments and controls. Type NSY-12 self-starting, single-phase synchronous motor and Type NSI-12 induction motor are built.

## Motors, Induction

*General Electric Co., Schenectady, N. Y.* (Vol.76,p.954.) 50.

Splash-proof induction motors incorporate end shields of special construction, the top half being solid to exclude dripping

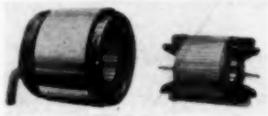


water and liquids. Cooling air enters through ventilating openings in the bottom half of the end shields.

## Motors, Rapid-Reversing

*Louis Allis Co., Milwaukee, Wis.* (Vol.76,p.1015.) 91.

Rapid-reversing, squirrel-cage motors, capable of 60 reversals per minute continuously without overheating, employ light-

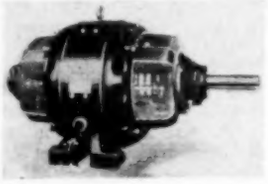


weight rotor construction, efficient ventilation, high-torque characteristics and shock-resisting cast-iron frames. The rolled-shell shaftless type is shown.

## Motor, "Self-Syn"

*Ideal Electric & Mfg. Co., Mansfield, O.* (Vol.76,p.918.)

This "Self-Syn" motor is compact, self-excited, self-synchronizing. It is started with a hand-operated compensator.



Unity or 80 per cent leading power factor is standard. Sizes: 5 to 100 hp.; 900, 1,200, and 1,800 r.p.m.

## Motors, Splash-proof

*Louis Allis Co., Milwaukee, Wis.* (Vol.76,p.1175.) 199.

Water splashed under pressure and from any angle is claimed not to gain entrance into this splash-proof motor. The motor is said to be adequately ventilated and is built to the same dimensions as standard open motors.

## Motors, Split-Phase

*Leland Electric Co., 1501 Webster St., Dayton, O.* (Vol. 76,p.1240.) 264.

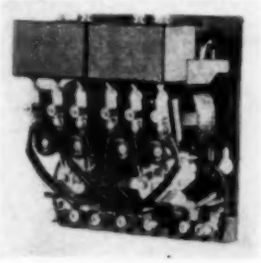
The Type KS motor is a split-phase, quiet-operating type for normal torque and light starting torque. It is suitable for ventilating equipment, oil burners and fans. The Type

KL is an electrolytic-start, split-phase type, made in ⅛, ¼ and ½-hp. ratings. Both motors can be had in rigid and cradle rubber-spring mounted designs.

## Contactors, Magnetic, Three-Pole

*Square D Co., Milwaukee, Wis.* (Vol.76,p.923.) 38.

A three-pole reversing magnetic contactor, interchangeable in rating and dimensions for a.c. and d.c., has a maximum

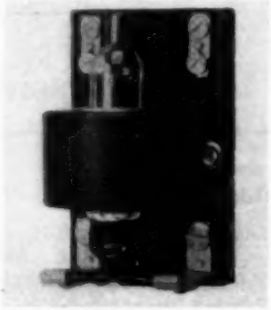


rating of 3 hp. The unit is adaptable for hoists, reversing mechanisms of machine tools and similar applications. It is arranged for either two-wire or three-wire control. For a.c., the contactor is designated as Class 8711; for d.c., Class 7711.

## Relay, "Magnetrole"

*Hart Mfg. Co., Hartford, Conn.* (Vol.76,p.953.) 52.

Motor and light control, time and temperature control, signal equipment and photo-electric cell operation are uses of the "Diamond H" Magnetrole relay.

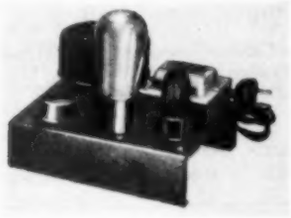


The relay requires an operating current of 5 watts as a maximum for the 10 and 20 amp. sizes. There is no exposed arc and the device will operate continuously at up to 120 operations a minute.

## Relay, Photoelectric

*G-M Laboratories, Inc., 1735 Belmont Ave., Chicago, Ill.* (Vol.76,p.986.) 78.

The "Foto-Switch," or photoelectric relay, incorporates an electro-magnetic switch which is



opened or closed by the interruption or variation in the illumination on the photoelectric cell.

## Starters, A.C.

*Square D Co., Milwaukee, Wis.* (Vol.76,p.1019.) 96.

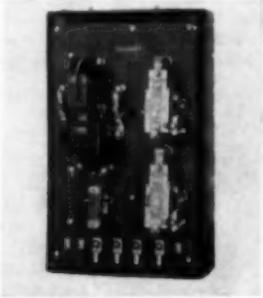
A.c. combination starters of water and dust-tight construction in the cast-iron type, consist of an across-the-line starter, motor control switch and test

jack. Thermal overload protection and low-voltage protection are provided.

## Starters, Mill-Type

*General Electric Co., Schenectady, N. Y.* (Vol.76,p.1145.)

For constant-speed d.c. motors, these starters utilize newly developed accelerating contactors which have been designed not

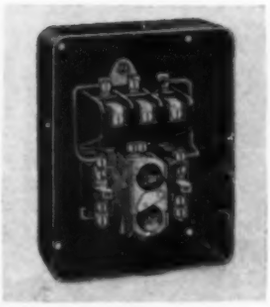


only to act in the capacity of a relay to provide time delay, but to short out the starting resistor.

## Switch, Starting

*Allen-Bradley Co., 1311 S. First St., Milwaukee, Wis.* (Vol.76,p.954.) 47.

A manually operated starting

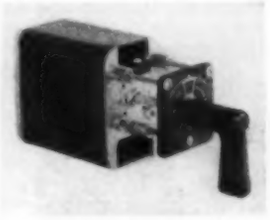


switch for small a.c. motors, this Bulletin 609 switch has two overload relays, and tripping of either opens the contactor and completely disconnects the motor from the line. Either relay can be reset without opening the switch cabinet. Three sizes, 1 to 7½ hp.

## Switch, SB-1

*General Electric Co., Schenectady, N. Y.* (Vol.76,p.952.) 55.

A compact, inexpensive switch for electric operation of circuit breakers, governors, rheostats,

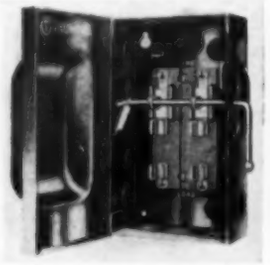


and instrument transfer, the Type SB-1 can be used upon various combinations for different applications by means of interchangeable parts.

## Switch, High-Speed

*Trumbull Electric Mfg. Co., Plainville, Conn.* (Vol.76,p. 1019.) 89.

Type D inclosed switch for general use and motor starting service is rated at 2 hp. This switch, No. 24921, is intended

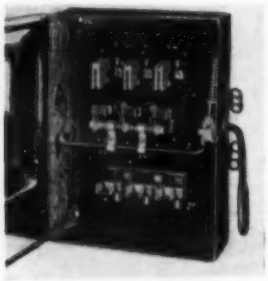


for 230 volts a.c. or 250 volts d.c. and is of 30 amp. capacity, fusible, and has 2 poles and 2 blades.

## Switches, Industrial, Type C

*Square D Co., Detroit, Mich.* (Vol.76,p.1051.) 117.

Improvements are larger boxes, positive quick-make and quick-break operating mechanism and the addition of posi-



tive-pressure fuse clips. These features make the Type C switches equivalent to the Type A switches, with the exception of keyed interlocking. Capacities range from 30 to 600 amp., 250 volts, and 30 to 200 amp., 575 volts, fused or unfused.

### Switches, Industrial, "R.B."

*Trumbull Electric Mfg. Co., Plainville, Conn.* (Vol.76,p.1210.) 131.

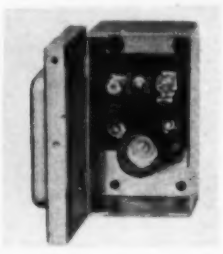
The following sizes have been added: 30, 400, 600 and 800 amp., including 2, 3 and 4 pole, 230 and 575 volts, a.c.,

both side and front-operated. This line has a fuse clamping device which reduces heating at the fuse terminals, and also a heavy pressure roll contact.

### Switch, Disk, 1-Hp.

*Square D Co., Detroit, Mich.* (Vol.76,p.1178.) 205.

A small, compact and low-priced front-operated switch for rebuilt machinery and appliance installations. Catalog number,



90211. Dimensions: 5⅜ in. high, 3⅛ in. wide, 2¾ in. deep. Capacity, 30 amp. at 125 volts.

### Control for Press Drives

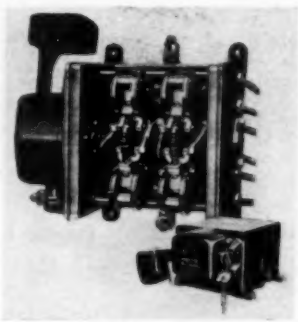
*Cutler-Hammer, Inc., 12th & St. Paul Ave., Milwaukee, Wis.* (Vol.76,p.1140.) 159.

The patented safety feature is a plurality of palm-operated pushbuttons mounted directly on the slide of the press. This insures that each hand of each operator will be occupied in holding a button depressed, and will consequently be free from the press when the slide is descending.

### Stop, Crane-Limit

*Cutler-Hammer, Inc., Milwaukee, Wis.* (Vol.76,p.1145.) 92.

This small-size crane limit safety stop, with standard mill-type blowouts and contact tips,



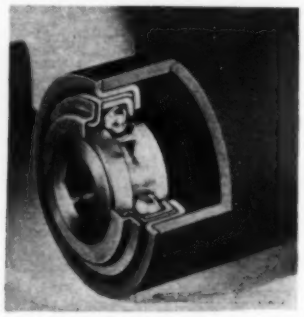
is rated at 40 hp. and under. It takes only 9 in. of headroom. The cover is removable.

## Material Handling Equipment

### Bearings, Conveyor

*Logan Co., Louisville, Ky.* (Vol.76,p.923.) 4.

Labyrinth construction of the patented ball bearings for roller conveyor applications prevent entrance of dust particles. The

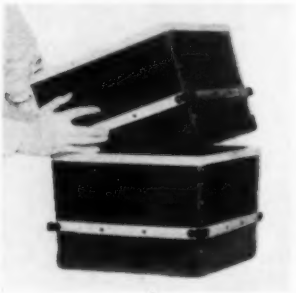


bearing is made in light, medium and heavy sizes. The dust shield does not come in contact with the shaft to increase friction or develop wear.

### Boxes, Fibre, Nesting

*Spaulding Fibre Co., Tonawanda, N. Y.* (Vol.76,p.1141.) 166.

For transporting small parts in the shop, the compact nesting boxes shown are made of fibre board, solid riveted,

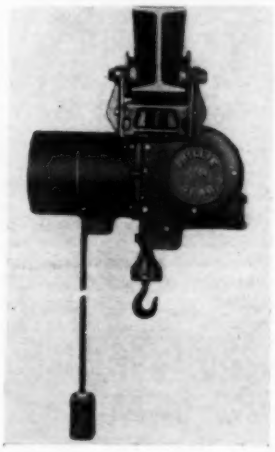


with steel reinforcement at the corners and top edges. The size is 13x13x9 in. The boxes are lacquered and because of the material they are light in weight yet strong.

### Hoists, Electric

*Philadelphia Gear Works, Philadelphia, Pa.* (Vol.76,p.1049.) 86.

Sizes, ½ to 3 tons. The hoist has the following features: High lift with low headroom; balanced so that load is always under center of rail; trolleys



turn on 4-ft. radius; fine control of load; sealed operating mechanism; heavy-duty construction and interchangeability of parts. Standard electric motors and Timken roller bearings are used.

### Truck, Singlelift, "Gold Flash"

*Lewis-Shepard Co., Watertown Station, Boston, Mass.* (Vol.76,p.841.) 5.

Reduced headroom and a high-capacity release check used to govern the load in lowering are features of the "Gold Flash"

single-lift truck. Capacities, up to 5,000 lb.; widths, 17½ or 24 in.; lifts, 1⅝ or 2½ in. When in the load raising position, the handle is always connected to the load.

### Truck, Die-Handling

*Elwell-Parker Electric Co., Cleveland, O.* (Vol.76,p.983.) 80.

The truck was designed for the removal of 4½-ton dies from presses, transporting them through 7 ft. 6 in. high doorways and placing them in racks.

Two cables are attached to the die. A winch winds in the cables and draws the die onto the elevating platform of the truck.

## Transmission Equipment

### Speed Reducers, Motorized

*Millholland Corp., 1145 E. 22nd St., Indianapolis, Ind.* (Vol.76,p.839.) 2.

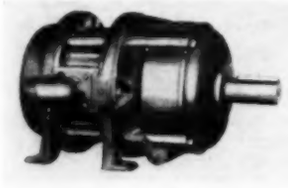
Ability to use a standard motor without special bearings, shafts or end bells is the feature of these motorized speed reducers. The speed reducers are of the worm type, anti-friction bearings supporting the worm and worm gear. The output

shaft is made to project in any one of four positions in two planes. Sizes are available to fit ½ to 10 hp. standard motors.

### Speed Reducers, Motorized

*General Electric Co., Schenectady, N. Y.* (Vol.76,p.921.) 31.

These "Gear-Motors" consist of a normal-speed motor in combination with a built-in internal-helical, planetary gear

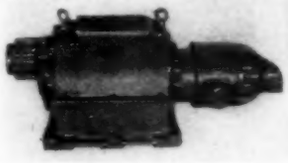


speed reducer. The company also offers gear-motors with special electrical characteristics. Standard gear-motors can be had with shaft speeds down to 13 r.p.m.

### Speed Reducer, Motorized

*Link-Belt Co., 910 S. Michigan Ave., Chicago, Ill.* (Vol. 76,p.954.) 34.

The advantages of using a motor with extended shaft and mounting it in this manner are: increased efficiency, compactness, reduced floor space, and elimination of high-speed motor-

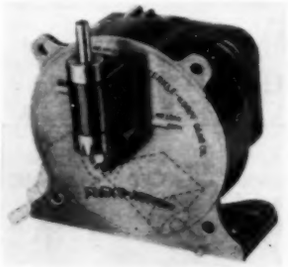


shaft coupling. Roller bearings and continuous-tooth herringbone gears are used.

### Speed Reducer, Motorized

*Merkle-Korff Gear Co., 213 N. Morgan St., Chicago, Ill.* (Vol.76,p.1018.) 104.

This unit can be supplied in any speed from 3,000 r.p.m. down and for either clockwise or counter-clockwise rotation. Both horizontal and right-angle drives can be supplied. An in-

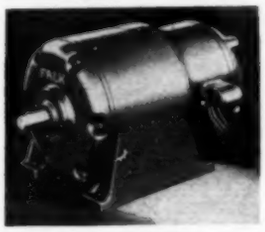


duction (shaded-pole motor) or synchronous motor is used. Dimensions: Horizontal drive, height, 3½ in.; width, 3⅜ in.; depth, 2 7/16 in.; right-angle drive, height, 3½ in.; width, 3⅜ in.; depth, 3 7/16 in.

### Speed Reducers, Motorized

*Falk Co., Milwaukee, Wis.* (Vol.76,p.1050.) 112.

Three styles of Motoreducers are built. The gear housing acts as a support for the motor. In the integral type, the motor end bell is removed. In the all-motor type, any standard hori-

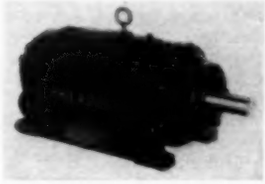


zontal-type motor may be employed, the motor being connected through a Falk flexible coupling. In the flexible type, the round-frame type motor is used and the end bell is retained. All three types are supplied in horsepowers from ¾ to 75, and in ratios from 4.6 to 288.

### Speed Reducers, Motorized

*Philadelphia Gear Works, Philadelphia, Pa.* (Vol.76,p. 1051.) 113.

In the "MotoReduceR" the motor and gear apparatus are contained in a single housing with supporting feet at each end. There is no overhang of the gear or motor. Helical gears run in oil bath. All bearings are of the anti-friction

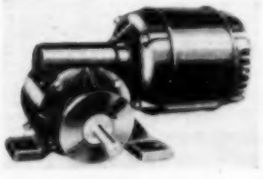


type. The unit is available in single, double and triple types with ratios up to 450 to 1, furnished with open type or totally inclosed motors, polyphase and single phase, or with d.c. motors up to 10 hp.

### Speed Reducer, Motorized, Type SW-2

*Janette Mfg. Co., 556-558 W. Monroe St., Chicago, Ill.* (Vol. 76,p.1141.) 149.

Unit consists of a ball-bearing Janette motor mounted integrally with a worm gear reduction unit. Twelve ratios, ranging from 90:1 to 8:1, are standard. Motors of ¼ to 1 hp.



### Speed Reducer, Motorized, Vertical

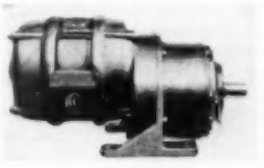
*Philadelphia Gear Works, Philadelphia, Pa.* (Vol.76,p. 1144.) 151.

Similar in design to the horizontal - type "MotoReduceR" (*AM*-Vol.76,p.1051), the vertical-type is suitable for driving agitators, mixers and other machinery. The reducer is available in single, double and triple types with ratios up to 450:1.

### Speed Reducers, Motorized

*Ideal Electric & Mfg. Co., Mansfield, O.* (Vol.76,p.1173.)

The high speed gear is mounted directly on the motor shaft. Ratios are from 2.09 to 1 up to 376 to 1, giving output



speeds from 861 r.p.m. to 4.7 r.p.m., using a standard 1800-r.p.m motor Open or inclosed motors are furnished Capacities, ¾ to 20 hp.

### Speed Reducer, Motorized

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.* (Vol.76,p.1211.)

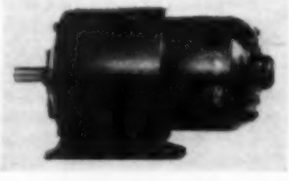
A standard round-frame motor is mounted directly on the gear reducer housing. Helical gears are employed. Speeds at

the power take-off are from 3.02 r.p.m. to 380 r.p.m. Bearings supporting the gear drives are ball or roller types.

### Speed Reducers, Motorized

*Louis Allis Co., Milwaukee, Wis.* (Vol.76,p.1209.) 235.

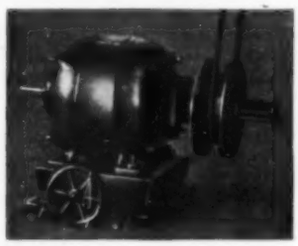
Motorized speed reducers capable of employing nearly any type of motor have been placed on the market. Motor and speed reducer are combined into a compact unit. Ratings are ¾ to 75 hp.; output speeds, 4 to 400 r.p.m. Efficiencies, to 97 per cent.



### Drive, V-Belt, "Acme"

*N. J. Oak, 22 Hawthorne St., Lynn, Mass.* (Vol.76,p.1145.) 168.

The drive consists of a motor on an adjustable base and a cone arrangement on the extended motor shaft. Both cones have wide radial slots so that



the raised portions left thereby act as driving members on the V-belt. The outer disk, or cone, moves axially on the shaft and is urged toward the stationary disk by means of a spring.

### Transmission, Chain, Variable-Speed, Acme

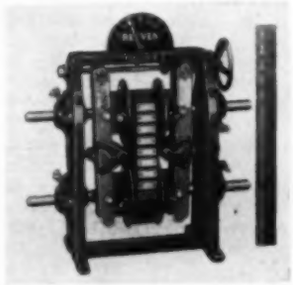
*N. J. Oak, 22 Hawthorne St., Lynn, Mass.* (Vol.76,p.1211.)

This variable-speed unit consists of two cone-faced, intermeshing flanged disks mounted on a sleeve, each disk having a series of steps and three slides. The steps support the chain at different diameters according to the size of sprocket unit for which it is adjusted. The variable-speed unit is made in nine sizes, transmitting from ½ to 12 hp.

### Transmission, Variable-Speed, No. 0000

*Reeves Pulley Co., Columbus, Ind.* (Vol.76,p.1211.) 248.

Limited space requirements allow this unit to be incorporated in a machine in the upright position. It may be

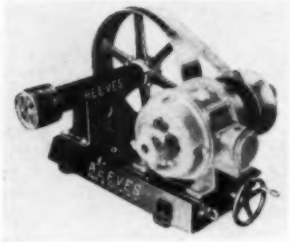


equipped with a motor base and driving motor. Speed range is from 2:1 to 6:1, inclusive. Capacities are from ½ to ¾ hp.

### Countershaft Unit, Motorized

*Reeves Pulley Co., Columbus, Ind.* (Vol.76,p.955.) 61.

This unit embodies a standard "Vari-Speed" motor pulley, which consists of two opposing

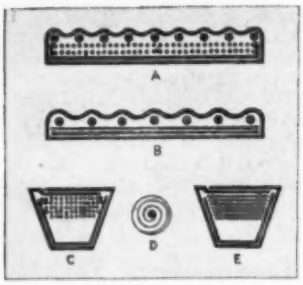



cone-faced disks, one stationary and one sliding, and an adjustable power compression spring, all mounted on the shaft of a standard motor. This assembly is mounted in turn on a special sliding motor base. The variable-speed pulley drives a countershaft. Sizes to 7½ hp. are built.

### Belts, Endless and V-Type

*L. H. Gilmer Co., Tacony, Philadelphia, Pa.* (Vol.76,p. 1015.) 108.

The "Panama Kable Kord" endless belt at *A* has a lower section comprising layers of parallel pulling cords. Upon this section are superimposed heavy Kable-Kords. In Kable-Kord non-endless *B* the top cover and the bottom cover




each count as a ply. The Kable-Kords are spaced three to the inch.

An improved V-type belt is designed to eliminate internal heating. As shown at *C*, numerous strands of fine cords are used in the upper half of the belt. It is claimed that under maximum load this V-belt will stretch less than 1 per cent. The V-type non-endless belt, shown at *E*, is constructed of plies of special fabric rather than of cords. At *D* is a round belting which is rolled out of a special fabric, rubber impregnated. "Speedage" fabric belts are woven endless and operate at speeds of 6,000 to 12,000 ft. per min.

### Belting, Transmission, "Highflex Junior"

*B. F. Goodrich Rubber Co., Akron, O.* (Vol.76,p.1082.) 142.

The belting is built up of a number of plies of a specially woven fabric designed to give the proper characteristics when spliced endless on an electrically heated machine. Highflex Junior is made in widths 6 in. and under. A special cement and tie gum are necessary.

### Belting, Rubber, "Compensated"

*Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J.* (Vol.76,p.1207.) 188.

The belt has a specially treated surface with two times the coefficient of friction ordinarily found. The belt is compensated to run on small sizes of pulleys. Outside plies are said not to rupture, and the tendency for fasteners to work loose and pull out has been minimized.

### Tip for Belts

*Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J.* (Vol.76,p.1175.) 219.

An extensible tip for endless fabric belts is applied to the outside plies of the belt before the two ends are interlapped and made endless. It consists of a series of perforated holes in the outside plies into which tie-gum is pressed. The rest of the union is interlapped, cemented and vulcanized in the usual fashion.

### Chain, Roller, "Silverlink"

*Link-Belt Co., Indianapolis, Ind.* (Vol.76,p.1207.) 240.

"Silverlink" roller chain is made in all sizes from ⅜ to 2½ in. pitch. The sidebars are especially treated to resist corrosion, and this treatment gives them the appearance of silver. Complete drives are carried in stock in sizes up to 225 hp., and in speed ratios of 1 to 1 up to 8 to 1.

### Clutch, Magnetic

*Magnetic Mfg. Co., Milwaukee, Wis.* (Vol.76,p.1209.) 229.

This small "Stearns" clutch for machine tools is 5 in. in diameter but develops 500 in.-lb. It weighs only 9½ lb. Length

is 3¾ in. Current consumption is approximately 100 watts.

### Clutch, Disk-Actuated

*Kinney Mfg. Co., 3529 Washington St., Boston, Mass.* (Vol. 76,p.1113.) 150.

Driving mechanism of the cut-off coupling illustrated consists of a spiral band contracting on a driving hub, the band being actuated by a flat asbestos-

faced friction disk. The shifter sleeve is a cone type. For the sleeve or pulley clutch, in place of the hub the clutch is fitted with a sleeve for mounting the pulley, gear or sprocket. Three sizes are 3, 10 and 18 hp. per 100 r.p.m.

### Coupling, Flexible

*D. O. James Mfg. Co., 1114 W. Monroe St., Chicago, Ill.* (Vol.76,p.1112.) 169.

The center member is made of a non-metallic material self-lubricated by means of a reservoir within itself. This center member slides between the jaws

of one metal flange on a line passing through the center and is free to slide across the face of the second flange.

### Gears, Silent, Steel

*Smith & Serrell, 30 Washington Place, Newark, N. J.* (Vol.76,p.951.) 48.

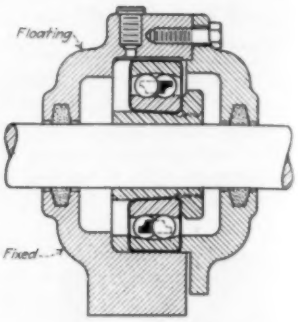
All-steel gears and gear blanks are built up of many thin pieces of sheet steel, coated with graphite and subjected to pressure. They are silent in operation. They have the appearance of a ground steel gear of ordinary construction.

The gears are distributed by the above company and made by John Waldron Corp., New Brunswick, N. J.

### Pedestal, Ball-Bearing

*Norma-Hoffmann Bearings Corp., Stamford, Conn.* (Vol. 76,p.1211.) 217.

This line is designated as the "L U P" Series and is adapted

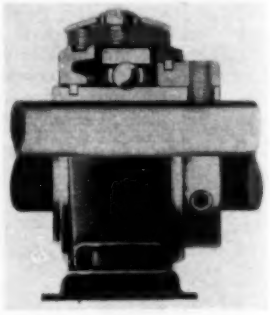



to average industrial requirements. It is made in sizes to fit standard shafting in nominal inch as well as sixteenth diameters, from 1 3/16 to 3½ in.

### Pillow Block, Ball-Bearing

*Dodge Mfg. Co., Mishawaka, Ind.* (Vol.76,p.918.) 39.

Two-piece pressed steel construction for the housing and automotive-piston-ring type grease seals are the two outstanding features of the Type



DH-1 ball-bearing, self-aligning pillow blocks. Both radial and thrust load capacity is provided. Shaft sizes, ¾ to 2 7/16 in.

### Pulleys, "Day-Steel"

*Dayton Rubber Mfg. Co., Dayton, O.* (Vol.76,p.921.) 30.

"Day-Steel" single and multiple V-groove pulleys are for use with Dayton cog-belts of ratings of 7½ hp. and below. These pulleys are formed from heavy-gage pressed steel welded at the rim and at the web.

## Welding Equipment

### Welding Sets, Gas-Engine, "Flexarc"

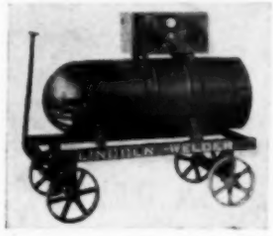
*Westinghouse Electric & Mfg. Co., E. Pitsburgh, Pa.* (Vol.76,p.842.) 6.

The 300- and 400-amp. gas-engine-driven "Flexarc" welders embody: canopy protection from weather, accessible controls, transformer-type reactance to prevent current surges and electrode sticking, 6-in. rim, steel tired wheels or smaller-type shop wheels, or pneumatic or solid-tired wheels. Exciters can be furnished to operate small portable tools.

### Welding Set

*Lincoln Electric Co., Cleveland, O.* (Vol.76,p.843.) 10.

This "Shielded Arc" welder is claimed to allow the use of a higher average current per size of rod, to permit increase in the speed of welding and the amount of weld metal deposited.

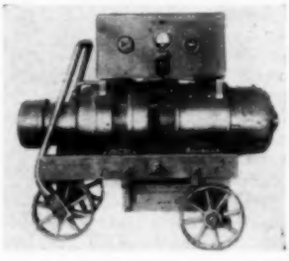


The welder is rated at 40 volts instead of the former 25, and the kilowatt rating has been increased 60 per cent. The welder is equipped with dual control and with a reversible voltage control. It is built in a.c. and d.c. motor-driven types of 300, 400, and 600 amp. sizes.

### Welding Set, Arc, "Imperial"

*Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.* (Vol.76,p. 1178.) 201.

Arc welders from 100 to 800 amp. and larger are embodied in the improved line. Machines may be had in motor-driven,

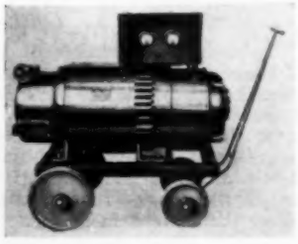


gas-engine-driven, belt-driven, and track welder arrangements. Features are dual control, separate excitation, reverse polarity switch and rubber mounting.

### Welding Sets, Improved, "Hansen"

*Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.* (Vol.76,p.1211.) 227.

A new magnetic bridge and a short-circuit winding have extended the welding range and improved the arc recovery and arc

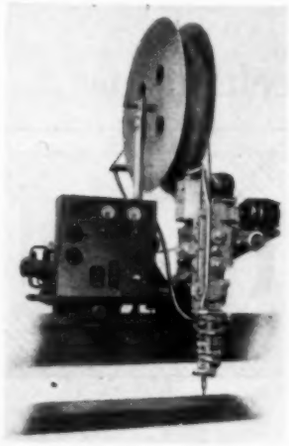


stability. The dead-front control cabinet adds to the appearance and simplifies the design. Single-operator, electric motor-driven types are produced in 100, 200, 300, 400, 600 and 800-amp. sizes.

### Welding Head, Automatic

*General Electric Co., Schenectady, N. Y.* (Vol.76,p.1178.)

The head has capacity for heavily coated electrode up to $\frac{1}{8}$ in. It is rated up to 600 amp. A wide range of plate for Class I pressure vessels can be welded by making several passes.



### Cutting and Beveling Machine, Pipe

*Air Reduction Sales Co., Lincoln Bldg., 42nd St., New York, N. Y.* (Vol.76,p.1241.)

Pipe is cut off and beveled to the desired welding angle by the No. 1 Airco portable pipe cutting and beveling machine. The machine comprises a light four-wheel carriage mounted on a crank-driven chain sprocket and

has a torch-supporting bracket. By a hand crank the sprocket can be made to turn the pipe if it is free or to turn the machine around the pipe.

### Blowpipe, Welding

*Linde Air Products Co., 30 East 42nd St., New York, N. Y.* (Vol.76,p.842.) 17.

The "Oxweld" Type W-22 is very similar to the Type W-17 welding blowpipe, except that the oxygen and acetylene valves

are located on the front of the handle, so that flame adjustments may be made more readily.

### Cutting Attachment

*Smith Welding Equipment Corp., 2619-33 Fourth St. S.E., Minneapolis, Minn.* (Vol.76,p. 952.) 59.

The cutting oxygen valve is a triple-thread, screw valve with knurled thumb wheel, so arranged that it can be quickly opened and closed with the thumb. The cutting tip automatically evens up the flames.

### Electrode for Manganese Welding

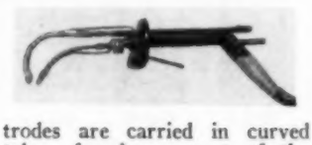
*General Electric Co., Schenectady, N. Y.* (Vol.76,p.1209.)

Type W-85 coated electrode for manganese welding finds its principal application in the building up of worn manganese steel castings and in repair of such fractured parts. The coating makes the electrode suitable for both a.c. and d.c. welding.

### Holder, Electrode, Welding, Atomic-Hydrogen

*General Electric Co., Schenectady, N. Y.* (Vol. 76,p.1177).

An electrode holder for atomic-hydrogen welding with flexible tungsten electrodes has been developed. These elec-



trodes are carried in curved tubes, forming a part of the holder, and are brought into position by means of a screw feed.

### Jigs, Welding

*Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.* (Vol.76,p.1079.) 119.

The Type T position finder is suitable for handling one- and two-side work on structures of irregular dimensions. Complete table assembly, including the

rotating track, is mounted on trunnions tilting in either direction through an arc of 60 deg. The Type L position finder is for long narrow structures requiring welds on four sides. Headstocks are readily adjustable to accommodate structures ranging from 1 to 16 ft. in length.

### Shield for Welding Operators

*Lincoln Electric Co., Coit Rd. & Kirby Ave., Cleveland, O.* (Vol.76,p.955.) 62.

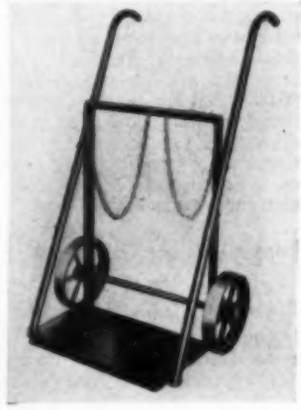
A movable protective lens which allows the operator clear vision without raising the shield is embodied in the "Weld-Fast" head shield. Slight pressure

with the chin on an aluminum rest raises the lens and permits the operator to view the work. A stationary cover glass guards the inner lens against spatter.

### Truck, Welding-Cylinder

*Linde Air Products Co., 30 E. 42nd St., New York, N. Y.* (Vol.76,p.1047.) 111.

The frame of the No. 5 truck is made of 1¼ in. angle iron welded into a rigid unit. A beveled steel plate forms the cylinder platform. Cylinders are held in position by means of chains. Weight, 80 lb.



# Alloys and Steels

## Alloy, Zinc-Base, "Eraydo"

*Illinois Zinc Co., 332 S. Michigan Ave., Chicago, Ill.* (Vol.76,p.841.) 18.

This zinc-base alloy, containing about one per cent copper and a fractional per cent of silver, has a tensile strength about twice that of common zinc. It is produced in sheet and strip form in four tempers. Softest temper has ductility of pure zinc with a 50 per cent increase in tensile strength. The metal casts well either in sand or by die casting. The metal is easily plated, soldered, forged, drawn and spun. It is supplied in rod or wire form in either a free cutting grade or a tough condition.

## Beryllium Copper

*American Brass Co., Waterbury, Conn.* (Vol.76,p.1240.)

Beryllium copper possesses high tensile strength, high fatigue limit and hardness. The alloy is made in sheets, strips, rods, wire and tubes in sizes and gages in which phosphor bronze is ordinarily furnished. The 2.25 per cent beryllium content is standard. A 0.063 in. sheet, containing 2.5 per cent beryllium and heat-treated after rolling to 1½ numbers hard, reached a tensile strength of 196,000 lb. per sq.in.; elongation, 3 per cent in 2 in., and a Rockwell hardness of C42. Fully annealed 0.040 in. sheet containing 1.5 per cent beryllium has tensile strength of 49,900 lb. per sq.in.; elongation, 64.5 per cent in 2 in., and Rockwell hardness, B25. Machinability of the alloy compares favorably with that of other high strength metals.

## Bronze Alloy, "Federalite"

*Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit, Mich.* (Vol.76,p.1207.)

A modification of iron-bearing aluminum bronze, known as "Federalite," is a metal of high strength and easy flowing characteristics suitable for casting in thin sections. Physical characteristics are: Tensile strength, 80,000 lb. per sq.in.; proportional limit, 30,000 lb. per sq.in.; elongation, 30 per cent; hardness, 72 Rockwell B; modulus of elasticity, 17,000,000. Resistance to corrosion is high.

## Iron, Enameling

*American Rolling Mill Co., Middletown, O.* (Vol.76,p.955.)

Greater adhesion between the enamel and the iron is claimed for "Armco" crystal-etched enameling iron. Reboiling behavior is improved, and imperfections, such as black specks, are reduced.

## Steel, Stainless, Two-Ply, "Ingoclad"

*Ingersoll Steel & Disc Co., Chicago, Ill.* (Vol.76,p.917.) 43.

This two-ply stainless steel may be deep drawn, stamped, welded, formed and polished, and is now being produced in various gages and sizes. The metal is produced from the composite ingot.

## Steel, Nickel-Clad

*Lukens Steel Co., Coatesville, Pa.* (Vol.76,p.1208.) 232.

Until lately, the nickel-clad steel has been available only in the regular hot-rolled finish, the nickel surface of which carries the tightly adherent nickel oxide film, dark olive brown in color. A new finish is now also available, classified as "hot-rolled and cleaned," being free from nickel oxide. The cleaning process gives the nickel a mat appearance nearly white in color.

# Parts and Mechanisms

## Bearing, Ball, "CD"

*Norma-Hoffmann Bearings Corp., Stamford, Conn.* (Vol. 76,p.1110). 158.

Type "CD" duplex double-angular contact ball bearing is adapted for radial loads and high thrust loads in either direction. The width is no

greater than that of a standard single-row ball bearing. Bearings are available in light, medium and heavy metric series from 10-mm. to 100-mm. bore.

## Bearings, Ball, Small-Series

*Fafnir Bearing Co., New Britain, Conn.* (Vol.76,p.1142.)

Extra-small-series ball bearings in the seal type have been announced for instruments and

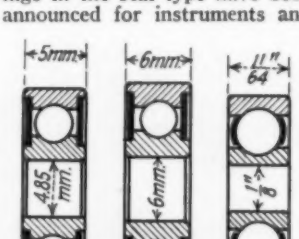


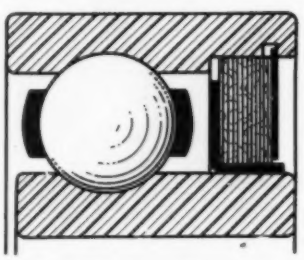

FIG.1 FIG.2 FIG.3

light applications. Bores are ⅛ in., 0.19 in. and 0.235 in. External diameters range from ½ in. to ¾ in.

## Bearing, Felt-Seal, T-Type

*Fafnir Bearing Co., New Britain, Conn.* (Vol.76,p.1144.)

By extending the width of both the inner and outer ring on the one side of the ball race

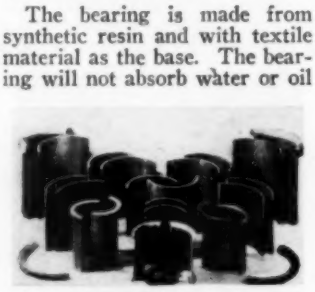


in this T-type bearing, space is provided for the fitting in of the entire seal assembly between two rings. The felt seal is inside of and located by the outer ring.

## Bearing, Synthetic-Resin

*Joseph T. Ryerson & Son, Inc., P. O. Box U, Chicago, Ill.* (Vol.76,p.1078.) 133.

The bearing is made from synthetic resin and with textile material as the base. The bearing will not absorb water or oil



and is resistant to most acids. It is claimed that the bearing will outlast babbitt and bronze.

## Compensator, "Wyromatick"

*Federal-Mogul Corp., Detroit, Mich.* (Vol.76,p.1014.) 94.

The compensator (*AM.*—Vol. 73, p. 1022) was intended for constant automatic maintenance of bearing adjustments. As now produced, it is provided with controlled preload that insures maintenance of any clearance necessary to allow for expansion and contraction. Specified bearing adjustment can be held within 0.00025 in., and the bearing adjustment may be as snug or as free as the designer specifies. Springs inserted in the master cam take care of the preload feature. The master and gage cams are a pair of

mating helical-cam-faced members, which, when assembled in their power position, will increase their joint cross-sectional dimension when rotated in opposite directions.

## Filter, Oil

*Howard B. Morrow Co., Mishawaka, Ind.* (Vol.76,p. 1016.) 107.

The oil in the cup must pass upward to the inside of the cone, thence out through the exit hole in the cup's central tube to the bearing. The felt filter works in a semi-inverted position, and is thus protected from all direct pollution. Sizes are available for practically all standard types of oil cups.

## Lubricating System, Trabon

*Lubricating Equipment Co., Detroit, Mich.* (Vol.76,p.1208.) 233.

Automatic pressure lubrication of all of the bearings on a machine by means of a one-tube circuit is now possible through recent refinements made in Trabon-type lubricators. One tube with short feeders to the bearings is now required. The forced-feed is supplied either by a small motor driving a rotary pump or by a ratchet-connection. Cycles possible are from 5 min. to 8 hours.

## Nuts, Wing, Cold-Forged

*Parker-Kalon Corp., 200 Varick St., New York, N. Y.* (Vol.76,p.955.) 63.

These wing nuts are claimed to be free from flaws, roughness and other imperfections and are so shaped as to provide ample finger grip for drawing them up tight. Holes are centrally located and punched. The base of the nut is smooth and square.

## Oiler, Bottle

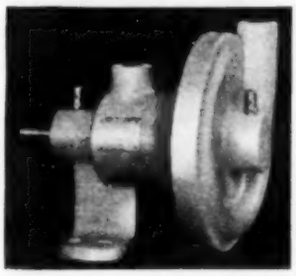
*Lunkenheimer Co., Cincinnati, O.* (Vol.76,p.1147.) 190.

Three major parts—a glass bottle with threaded neck, a bronze base with integral sleeve-type shank, and a brass feed wire—are employed in this bottle oiler for the lubrication of plain bearings. It feeds only when the shaft is in motion.

### Pump, "Spiral-Flo"

*Tomkins-Johnson Co., Jackson, Mich.* (Vol.76,p.1111.) 157.

Designed to eliminate necessity for closely fitting and machined parts within the pump chamber, the "Spiral-Flo" pump with ½-in. intake and ¾-in. outlet will provide 7 gal. per min. capacity at 1,000 r.p.m. and 14

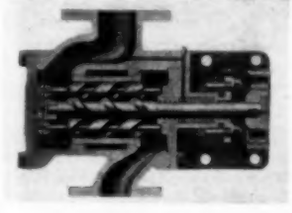


gal. per minute at 1,725 r.p.m. Ball bearings are protected by standard oil seals, and Alemite fittings are used. The pump is not affected by grit or chips.

### Pump, Rotary, "IMO"

*DeLaval Steam Turbine Co., Trenton, N. J.* (Vol.76,p.1210.) 231.

Capacities from ½ to 700 gal. per minute, and pressures up to 500 lb. per sq.in. are obtainable. Power is applied to a central or



power rotor, which meshes with one or more sealing rotors. Efficiencies, 80 to 90 per cent.

### Pump Parts, Standard

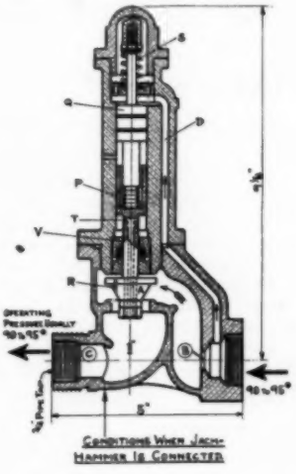
*Tuthill Pump Co., 131 W. 63rd St., Chicago, Ill.* (Vol. 76,p.1016.) 95.

To permit designers of machinery to blend the design of the lubricating or coolant pump into the machine, the company is now offering a standard cover, idler pin, idler and rotor. The designing engineer is permitted almost any combination of port arrangements with assurance of a compact pumping unit.

### Valve, Air

*Yarnall-Waring Co., 7700 Norwood Ave., Philadelphia, Pa.* (Vol.76,p.1179.) 216.

This valve was designed to prevent waste of air. The valve is placed near the end of the air




line. It permits definitely limited quantities of air to pass at various pressures, and serves to keep the shop supply at efficient working pressure for all tools.

## Miscellaneous Equipment, Processes and Supplies

### Chronolog, "Acme-Graybar"

*Graybar Electric Co., Graybar Bldg., 420 Lexington Ave., New York, N. Y.* (Vol.76,p. 1045.) 126.

The "Chronolog" is built by the National Acme Co., Cleveland, Ohio, and is distributed and serviced by above company. The instrument is a compact unit which can be applied to a production machine mounted on its own pedestal or attached to brackets on the machine.

Two interlocking oscillating switches actuate the recording mechanism. They are made interlocking to prevent falsifying

of the record. The left hand switch is operated by the upper end of the cam follower bell-crack, while the other switch is tripped by the finished piece as it drops from the machine. Inside the case is a paper roll on which is printed a record of the machine performance.

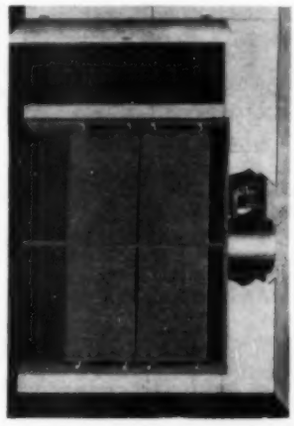
One function of the device is to record the number of pieces produced. The other function is to record the active and idle time of the machine and the reasons for idle time. While the machine is producing regularly, entries are made every 5, 10, 15 or 30 min. The record shows cumulative idle time and also cumulative production time, both in minutes. There is also a record of the reasons for the idle time. The telephone-type dial is used to record the symbols on the record. The operator inserts a key in the instrument while at the machine, and the key number is recorded.

The apparatus will print the last line of the record if a card is inserted and a lever is touched. One Chronolog may be used on more than one production machine, being shifted about as low production indicates that a particular machine needs attention. It operates on 110-volt, 60-cycle current.

### Exhaust Chamber for Spray Finishing

*De Vilbiss Co., Toledo, O.* (Vol.76,p.955.) 66.

This exhaust chamber for use in rooms which are already fireproof is designed to provide a means for mounting the exhaust fan and to distribute the ex-

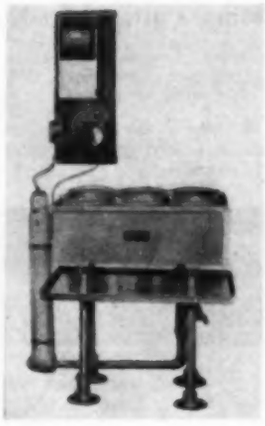


haust properly where a complete spray booth is not required or where an exhaust fan mounted in the wall or window will not adequately take care of the requirements. It is actually the back section of a standard spray booth.

### Glue Heater, Electric

*Divine Bros. Co., Utica, N. Y.* (Vol.76,p.839.) 11.

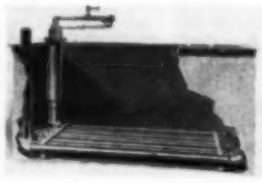
This thermostatically controlled electric glue heater maintains the temperature of the glue within 2 deg. F. The bath consists of a copper tank, insulated with a polished aluminum top. The heater is made with 4, 6 or 8 pots, the pot capacity being 2, 3, 4, 6, or 8 quarts.



### Heater, Immersion

*Steam & Combustion Co., Inc., 1559 Sheffield Ave., Chicago, Ill.* (Vol.76,p.1174.) 176

Gas-fired for heating soda solutions in metal cleaning apparatus and for heating galvanizing tanks, the heater fires into a submerged refractory-lined combustion chamber ex-

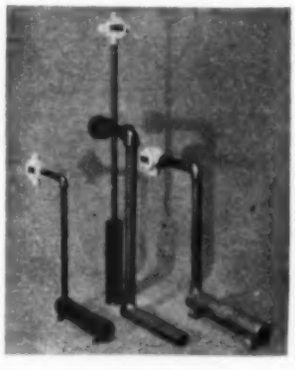


tended into a pipe coil, also submerged. These elements supply the necessary surface for transfer of heat. Nos. 3 and 4 have capacities of 85,000 and 175,000 B.t.u. per hour with air at 2.5 oz.

### Heater, Immersion Electric

*Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh, Pa.* (Vol.76,p.1210.) 225.

For melting lead, solder, babbit, tin and type metal; heating salt baths for heat-treating; heating oil baths for heat-treat-



ing; and heating pickling baths, the heavy-duty Chromolox electric immersion heaters are suitable for either 115 or 230 volts. Ratings, 1.5 to 6 kw.

## Plating Unit, Chromium

*United Chromium, Inc., 51 E. 42nd St., New York, N. Y.* (Vol.76,p.987.) 82.

The unit is so compact that it may be placed in the toolroom and immediately connected to

power, steam, water and waste outlets. It is simple to operate. The unit comes completely assembled.

## Brazing Process for Carbide Tools

*Thomas Prosser & Son, 15 Gold St., New York, N. Y., and 1050 Mt. Elliott Ave., Detroit, Mich.* (Vol.76,p.1241.) 252.

The "Z-Foil" process is claimed to produce a bond between the cemented carbide and the steel shank several times stronger than produced by copper brazing. The tips are guaranteed not to slip off. No dovetailing of the tip is necessary. Any type of steel can be used for the shank. Heat generated in cutting is more rapidly dissipated into the shank.

## Hardening Process, "Wearprooft"

*Mackintosh - Hemphill Co., Pittsburgh, Pa.* (Vol.76,p.1175.) 218.

For localized surface hardening, this "Wearprooft" process can be applied to gears, pinions, coupling boxes, spindles and similar products. They can be taken from stock or service and given this treatment. The Wearprooft process, it is stated, introduces no stress during the processing, and none thereafter. Hardness ranges from 60 to 90 Scleroscope.

## Anode Container, Ball

*Udylite Process Co., Detroit, Mich.* (Vol.76,p.1081.) 139.

The basket or container comprises a wire helix of diminishing pitch so that the cadmium ball anodes will not fall out as they grow smaller.

## Flux, Soldering, "Flosol Cream"

*American Chemical Paint Co., Ambler, Pa.* (Vol.76,p.1174.) 204.

"Flosol Cream" soldering flux is a white creamy chemical which is brushed on the metal to be soldered. The coating dries in from 10 to 15 min. The flux-covered surface can be tinned and soldered either before or after the coating dries. This flux was developed for soldering sheet steel where the prevention of rust is of importance.

## Gasket Compound, Glyptal

*General Electric Co., Schenectady, N. Y.* (Vol.76,p.917.) 37.

A gasket compound, which is oil-proof even in hot oil, and which is also proof against gasoline, kerosene, benzine and similar solvents, is known as Glyptal No. 1281. This compound may be used in contact with cemented joints and is a grey or brown, odorless, sulphur-free alkyd resin material. The material can be obtained in sheets up to 13 by 36 in.

## Hand Cream, Protective

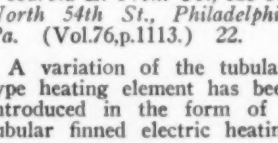
*DeVilbiss Co., Toledo, O.* (Vol.76,p.1141.) 174.

A white protective hand cream known as "Pro-Tek," is rubbed into the skin before working to form a protective film. The film is soluble only in water, and sticky substances and soiling materials do not penetrate it.

## Heating Element, Electric, Tubular

*Harold E. Trent Co., 618-640 North 54th St., Philadelphia, Pa.* (Vol.76,p.1113.) 22.

A variation of the tubular-type heating element has been introduced in the form of a tubular finned electric heating



element. The element can be obtained in straight lengths, circles and spirals.

## Hose, Composition-Lined

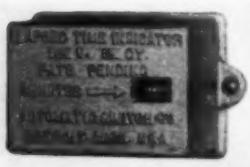
*DeVilbiss Co., Toledo, O.* (Vol.76,p.920.) 27.

Fluid hose is lined with a composition, which is not affected by turpentine and lacquer finish, gasoline, oil or grease. The material used for the liner does not lose its original flexibility.

## Indicator, Elapsed-Time, "SM"

*Automatic Switch Co., 6420 E. Lafayette Ave., Detroit, Mich.* (Vol.76,p.1141.) 148.

The "SM" elapsed time indicator is adapted for use as a lost time indicator on production machines. In connection with a Veeder counter to indicate the number of pieces produced, the elapsed time indicator gives correct data for time study. Drive for the indicator is by a self-starting synchronous motor. The device is available for use on 110 and 220 volts.



## Packings, Oil-Resistant

*Garlock Packing Co., Palmyra, N. Y.* (Vol.76,p.1050.)

Diaphragms, disks, and gaskets are made of various "Thiokol" compounds. This material has most of the characteristics of rubber, but is not affected by solvents and does not oxidize.

## Packing, Sheet

*Garlock Packing Co., Palmyra, N. Y.* (Vol.76,p.1143.)

No. 660 sheet packing for gasoline, oil or water incorporates granulated cork with tough paper fiber. It is resilient and soft enough to seal flanges or joints which may be imperfectly machined or in poor condition.

## Paper, Tracing, "Cassvell" Vellum

*National Consumers Paper Corp., Technical Papers Div., 227 Sixth Ave., New York, N. Y.* (Vol.76,p.1015.) 101.

Claims made for this tracing paper are: Dry surface—will not transfer oil; white-odorless; permanent transparency; and good erasing qualities. No. 102 is supplied in 20-yd. rolls, 36 in. wide, or in 20-yd. rolls, 42 in. wide.

## Slide Rule, Machinist's

*Blackman-Hill & Co., 1513 N. Broadway, St. Louis, Mo.* (Vol.76,p.1079.) 140.

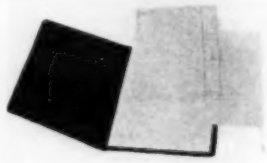
This shop calculator, called "The Machinist's Slide Rule," measures 7x2x¼ in., will indicate the proper speed for work, drill or cutter, the proper relative feed per tooth or per revo-

lution or per minute in milling, drilling, turning and boring operations, and will tell the approximate power required for a given speed, feed and cut based on the cu.in. per minute of metal removed.

## Sketch Pad, "E-Z-Draft"

*McCauley & Madison, Inc., Detroit, Mich.* (Vol.76,p.1083.)

The outfit combines an artificial leather cover, a 100-sheet pad of special transparent paper, and ruled bristol board plates to be inserted under the paper.

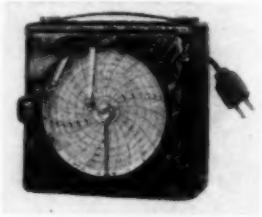


One plate is ruled isometrically on one side, and in standard ⅛-in. cross-section on the other. A plate for perspective sketches is included.

## Thermometers, Recording, Miniature

*C. J. Tagliabue Mfg. Co., Park & Nostrand Aves, Brooklyn, N. Y.* (Vol.76,p.1015.)

Two forms—a single-pen recording thermometer for charting temperature only, and a temperature and time-operation recorder which writes a continuous record of temperature as



well as the running and idling time of the motor. Special non-breakable transparent front. Dimensions are: 5¾ in. high; 5¼ in. wide; and 4¼ in. deep.

## Vibration Dampener

*Korfund Co., Inc., 48-15 32nd Place, Long Island City, N. Y.* (Vol.76,p.1244.) 256.

Isolation of light weight machines is the function of the "Seismo - Damper," which has the insulating material placed between the upper and lower

housing and preloaded so that the weight of the machine and preloading will operate the material at maximum efficiency. The upper housing of the damper is drilled and tapped for bolting to the machine base or leg. Maximum load per damper is 400 lb.

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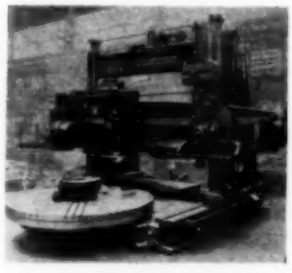
# Boring and Turning Machines

### Boring Mill, Special

*G. Richards & Co., Ltd., Broadheath, near Manchester, England.* (Vol.76,p.252E.) 30.

The standard boring mill has been modified to machine the bosses of large propellers. Height from floor is 28 ft. 4 in., width 35 ft. 6 in., and extreme depth from front to back, 28 ft. 1 in. Net weight is 152 tons. Machine takes work up to 17 ft. in diam. with the uprights in their forward position and up to 25 ft. with the uprights moved back. One swivel head is fitted, together with a special center head. A 50-hp. variable-speed motor and six-speed mechanism provide a full range of table speeds. The spindle of the center head has speeds ranging from 6 to 93 r.p.m. Sliding



units are powered by six motors.

The swivel head does the slotting and the center head the sawing, boring, facing and recessing operations on the propellor. The propellor and table are held stationary, but all the necessary mechanism is included to allow the machine to be used as an ordinary boring mill. For turning the table slowly for spacing purposes, when two or more keyways have to be cut in the boss, reducing gears are incorporated in the drive. Two mechanical force-feed pumps lubricate all bearings on the lower part of the machine. All motors are under push-button control.

### Boring and Facing Machine, Horizontal, Duplex

*Kitchen & Wade, Ltd., Halifax, England.* (Vol.76,p.447E.) 73.

This special machine is designed for machining locomotive connecting rod and side coupling rod bushings and

brasses. These parts are bored and faced in position at one setting of the rod. Maximum distance between the head centers is 12 ft. 6 in., between the boring centers 11 ft., and the height of centers from top of the bed is 13 in.

The two headstocks are provided with extra deep jaw chucks, the left-hand head being fixed, and the chuck provided with angular motion by means of a worm gear. The right-hand head is adjustable along the bed to accommodate varying lengths of rods. Two heavy steady-rests are provided. The two saddles and boring heads are independent, having separate motor drive and speeds and feeds. For boring and facing operations, expanding tools and self-acting facing heads are supplied. Floor space, 18 ft. by 7 ft.; net weight, 5 tons.

### Boring and Grinding Machine, Cylinder

*L. Kellenberger & Co., St. Gall, Switzerland.* (Vol.76,p. 244E.) 26.

The machine bores, grinds and also hones and, by exchanging the grinding spindle for a special spindle, the machine can be converted to fine boring at high speeds with tungsten-carbide tools. Maximum boring and grinding length is 750 mm., maximum diameter, 300 mm., while longitudinal traverse of the carriage by hand or hydraulically is 1,000 mm. Maxi-

mum distance from the spindle center to the table is 360 mm., or with the top removed 495 mm., vertical adjustment for setting-up purposes being 160 mm. Three spindle speeds range from 2,800 to 7,000 r.p.m. Six boring and eccentric speeds from 30 to 220 r.p.m. Power required, 4 to 5 hp.

The machine is equipped with an interchangeable eccentric grinding spindle. The eccentric adjustment can be effected without lost motion to a scale while running. A cutter head can be fitted for boring out the cylinder with a single-point cutter prior to grinding. A special fine boring spindle for the use of tungsten carbide has been fitted. The machine can be used for honing.

### Boring Machine, Cylinder, Portable

*Ward, Haggas & Smith, Keighley, England.* (Vol.76,p. 296E.) 44.

Reboring motor-car cylinders up to 4½ in. diameter by 10 in. deep is the function of this portable outfit. The cutter head can be centered easily and the cutter set to micrometer dial. Six cutters are fitted. An auto-

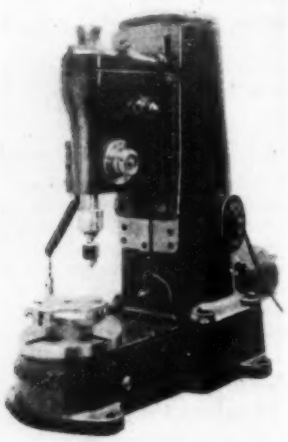
matic stop is provided and may be set for various depths of bore. Drive is from a ¾-hp. motor through two-speed pulleys and V-belts, and then through worm gearing to the boring bar. Weight of machine, 100 lb.

# Drilling Machines

## Drilling Machine, Sensitive, Bench, High-Speed

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.294E.)

Capacity, ¼ in. in steel or ⅜ in. in soft metals. The four-station indexing table enables loading and unloading of the work simultaneously with the drilling operation. Spindle head and electric motor are adjustable on the column, and a baseplate carrying the indexing table is driven by an independent electric motor. The spindle is



driven by a three-step cone. Maximum spindle stroke with hand feed is 2½ in., with automatic feed, 1¾ in. Distance from column to spindle is 6 in., diameter of indexing table, 8 in., maximum distance from drill chuck to indexing table, 7¼ in.

## Drilling Machine, Sensitive, Bench, Type S

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.448E.)

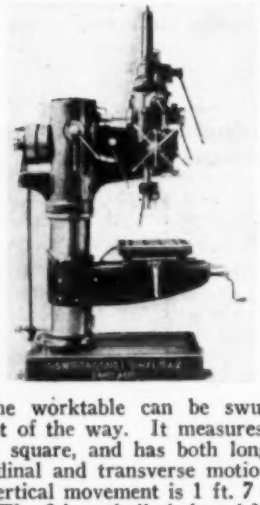
This bench drill was developed for the finest class of high-speed drilling, using drills up to ¼ in. or ⅜ in. on soft metals such as aluminum. Drive to the spindle is from a high-speed electric motor carried on an adjustable bracket projecting from the spindle head into the column. Pushbutton control is

provided. A small three-step cone pulley mounted on ball bearings gives spindle speeds of 6,000, 9,000 and 12,000 r.p.m. Feed motion is obtained from the hand lever. The spindle head has vertical adjustment on the column. An electric lamp throws light directly on the drill and the work. The stroke of the spindle is 2½ in., and maximum distance from drill chuck to the table is 8½ in. A circular table is provided.

## Drilling Machine, Upright, with High-Speed Spindle

*G. Swift & Sons, Ltd., Halifax, England.* (Vol.76,p.414E.)

This 36-in. drilling, boring, tapping and studding machine has maximum distance from the baseplate to the spindle of 4 ft. Maximum distance from the spindle to the top of table is 1 ft. 11 in. Baseplate working surface is 2 ft. 11 in. long by 3 ft. wide. For easy removal of the table, the knee is fitted on the pillar in two halves.



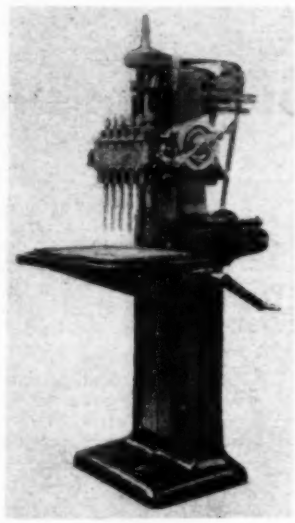
The worktable can be swung out of the way. It measures 2 ft. square, and has both longitudinal and transverse motions. Vertical movement is 1 ft. 7 in.

The 2-in. spindle is bored No. 4 Morse taper, and has a vertical traverse of 15 in. Both hand and power feeds are provided, as well as rapid traverse. Automatic trip motion to the feed is fitted. There are 18 spindle speeds available, 36 with the auxiliary spindle. Main spindle speeds are from 27 to 500 r.p.m. and auxiliary spindle speeds from 76 to 1,400 r.p.m. The feedbox gives 55, 75 and 105 cuts per in.

## Drilling Machine, Six-Spindle

*Adcock & Shipley, Bright St., Leicester, England.* (Vol. 76,p.335E.) 54.

Six spindles are bored No. 1 Morse taper, and can be located at minimum centers of 1¾ in.

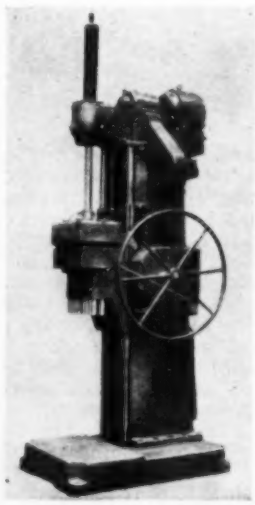


Maximum distance between the centers of the two outer drills may be as much as 12 in. Drill head has a stroke of 6 in. Independent adjustment of the spindles for various drill lengths is ⅞ in. Table working surface is 15½ x 23 in. Elevating motion is secured through a rack and pinion, safety trip pawl and catch. Three speeds are 1,600, 1,200 and 800 r.p.m. by means of a cone pulley. Feed rates are 0.008, 0.0065, and 0.005 in. per revolution.

## Drilling Machines, Multiple-Spindle

*Kitchen & Wade, Ltd., Halifax, England.* (Vol.76,p.299E.)

Representative of the motor-driven multi-spindle drilling and reaming machines introduced is the one illustrated with 16 spindles arranged in two rows on fixed centers. The spindle head is built in two types, one as shown, and the other with a back slide on the column face and with provision for fixing a variety of multi-heads where more than one job must be done. Baseplate working area is 40 by 23 in. Vertical traverse of the drilling head is 26 in. Drive is by a motor mounted at the top and through reducing gears

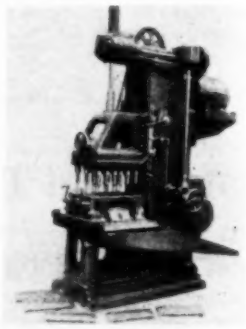


and hardened spiral bevels to the main driving spindles. The power feed is inclosed. A positive adjustable trip motion can be set for depth of drilling. Distance from the back row of spindles to the column face is 11 in.; maximum distance of spindles to baseplate, 60 in.; floor space, 45 by 60 in.; net weight, 4 tons.

## Drilling Machine, Upright, Multiple-Spindle

*Kitchen & Wade, Ltd., Halifax, England.* (Vol.76,p.463E.)

This special 20-spindle, semi-automatic motor-driven drill is designed for simultaneously drilling two valve cover lids for Ford cars. The sliding head is balanced by a weight. The whole transmission runs in ball journal bearings. Adjustment is arranged on the head for



utilizing long or short drills and for re-tooling. The sliding head is operated by means of a cam giving a complete cycle of quick advance to drilling position, feed for drilling and quick return to top position, where it is stopped automatically.

## Drilling Machine, Multiple-Head

*Adcock & Shipley, Bright St., Leicester, England.* (Vol. 76,p.316E.) 48.

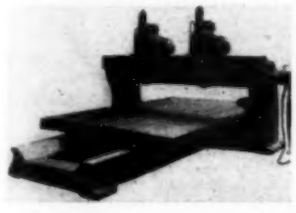
Drive is from a motor on a platform on the back of the head. Slip gears serve to change

spindle speeds. The four spindle speeds are 160, 248, 349 and 436 r.p.m. The spindle quill runs in long phosphor-bronze bearings and is provided with ball thrusts. The spindle is supplied in three types: Morse taper hole and cotter slot, stub-nosed form with flanged quill and Morse taper bore, or with stub nose and flanged quill only. Six speeds are 33, 43, 61, 95, 132 and 177 r.p.m. Feed drive is through drop worm. A sensitive hand feed is incorporated. Either a knee-type table or a box pedestal table can be supplied. Stroke is 9 in.; distance from center of spindle to column, 12 in., and working surface of knee table, 21x18 in.

### Drilling Machine, Cross-Rail, Two-Spindle

*Wm. Asquith, Ltd., Halifax, England.* (Vol.76,p.303E.) 45.

This electrically driven machine has two spindles for boring, tapping and studding. The bed measures 16 ft. 7 in. long by 5 ft. 3 in. wide across the slide ways. The worktable is 11 ft. 9 in. long by 7 ft. 10 in. wide, and is arranged to traverse between the uprights by power.

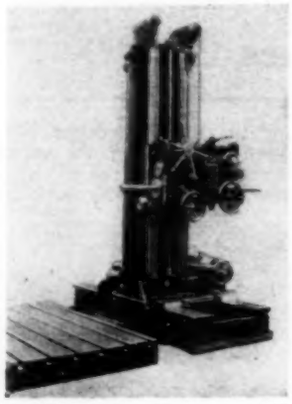


Hand motion is also provided. Spindle slides carry all working controls. Twelve spindle speeds range from 580 to 22 r.p.m. Spindles are bored No. 5 Morse taper, and have a vertical traverse of 14 in. Maximum distance from center to center of spindles is 8 ft. 6 in.; minimum distance 1 ft. 8 in.

### Drilling Machine, Horizontal

*G. & A. Harvey, Ltd., Glasgow, Scotland.* (Vol.76,p.266E.)

This horizontal drilling, tapping and stud-inserting machine has a 2½ in. spindle and all electric power traverses. Worktable is 7 ft. by 4 ft. Speeds

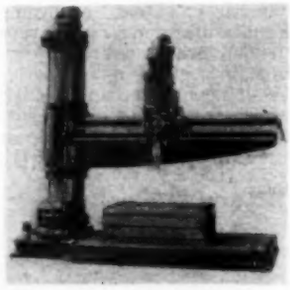


can be changed without stopping the machine. The double gear on the saddle gives a high speed for drilling and a slower speed for tapping. The tap is withdrawn at the high speed. The column is fitted with roller bearings. Saddle traverse is 5 ft.; minimum height of spindle from the floor, 2 ft. 8 in. Four feeds range from 1/31 in. to 1/125 in. More than 60 sets of ball bearings are used in the machine.

### Drilling Machine, Radial, 12-Ft.

*G. Swift & Sons, Ltd., Halifax, England.* (Vol.76,p.213E.)

This electrically driven centralized-control radial drill and tapping machine weighs 17 tons without electrical equipment. Column is 24 in.; arm vertical adjustment, 4 ft. 8 in. by power.



Machine will drill holes up to 4 in. diameter in mild steel and tap Whitworth threads up to 3 in. Working surface of baseplate is 11 ft. 4 in. by 6 ft. 6 in. The saddle is mounted on adjustable roller bearings. Spindle has No. 6 Morse taper; vertical traverse is 20 in. Twenty-four spindle speeds range from 9 to 450 r.p.m. Twelve tapping speeds are provided.

### Drilling Machine, Radial, 6-Ft.

*F. Town & Sons, Halifax, England.* (Vol.76,p.430E.) 69.

This motor-driven, centralized control radial drill is of the elevating-arm type and will drill 3½-in. holes in mild steel and 4-in. holes in cast iron. Baseplate working surface is 6 ft. by 3 ft. 8 in. One lever simultaneously locks the saddle to the arm and the arm to the column. The spindle has a vertical traverse of 17 in., and is bored No. 5 Morse taper. The 18 spindle speeds range from 26 to 580 r.p.m. Four geared feeds are

from 30 to 120 cuts per in., operating through a friction clutch. Automatic trip is fitted. The drive is by 12-hp. motor. Maximum distance from the spindle to the baseplate is 6 ft., and the traverse of the saddle is 4 ft. 6 in.

### Drills, Electric

*S. Wolf & Co., Ltd., Southwark St., London, S.E., England.* (Vol.76,p.225E.) 19.

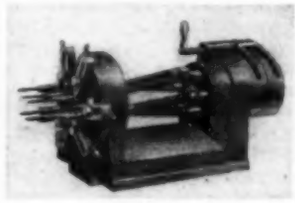
Universal motors are employed in these electric drills. Machines are built in ¼ and ½-in. sizes. The speed under load is 1,300 r.p.m. Body diameter, 3¾ in.; over-all length, 13¾ in.; and

weight including chuck, 6½ lb. These dimensions apply to the ¼-in. machine. Armature spindle is mounted on ball bearings.

### Drillhead, Multiple-Unit

*John Ackworthie, Ltd., Coleshill St., Birmingham, England.* (Vol.76,p.365E.) 58.

This six-spindle drillhead unit can be fixed upon the bed of a lathe or other machine. The No. 1 size will drill six holes up to ¼ in. diameter in steel, and the drilling spindles can be



grouped in any positions inside a 5½ in. circle. The No. 2 size will drill up to ½ in. diameter inside a 12-in. circle. Units with a maximum of ten spindles are made. Drillhead can be mounted to drill either left-hand or right-hand. Mounted on a slide, the unit traverses 9 in.

## Grinding Machines

### Grinder, Plain, Semi-Automatic, Hydraulic

*Stedall - Dowding Machine Tool Co., St. John St., Clerkenwell, E.C., England.* (Vol.76,p.226E.) 20.

This Naxos-Union grinder with special automatic features has been designed for rapid plunge-cut grinding with wide wheel on such work as automobile shackle pins. One lever controls the automatic sequence. A gear box provides eight speeds. Wheel feed for ordinary plain grinding may be actuated by hand or hydraulically at each reversal of the

table, and a fine pressure lever permits a feed as low as 0.0001 in. on the diameter to be obtained per stroke. By an adjustable graduated ring the predetermined grinding depth can be set, and when this is reached the feed is stopped automatically. A center grinding attachment is clamped to the upper table.

Specifications: Swing, 7⅞ in.; length, 19¾ in.; maximum diameter, 4 in. with a 23½-in. wheel and 7⅞ in. with a 19¾-in. wheel.

### Grinder, Surface, Horizontal

*Snow & Co., Ltd., Sheffield, England.* (Vol.76,p.203E.) 11.

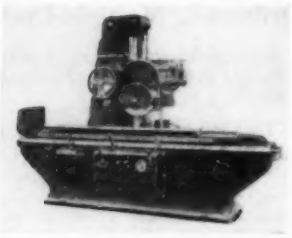
Work capacity, 24 in. long by 8 in. broad by 9 in. high. Table operated hydraulically, working surface 24 by 8 in., travel, 28 in. The saddle carries the hydraulic cylinder. Drive to table and wheel are obtained from two motors. Table speeds range

from zero to 100 ft. per min. Wheel drive is by 1½-hp. motor. Wheel spindle is mounted in taper roller bearings. Vertical slides for the grinding head are long as compared with the overhang of the wheel. Automatic feed, variable up to 1 in.

### Grinder, Surface, Openside

*Snow & Co., Ltd., Sheffield, England.* (Vol. 76,p.234E.) 24.

Working lengths of table, 72, 96 and 120 in. The head is counterbalanced, and long slides are provided. Head is raised and lowered by handwheel, and the wheelhead can be raised by



a 1-hp. auxiliary motor. Automatic cross traverse of the grinding wheel is obtained by a hydraulic unit. Cross traverse at each reversal is variable up to 2 in. and continuous cross traverse is variable up to 20 ft. per min. Work table is traversed hydraulically.

### Grinder, Surface, Horizontal

*A. A. Jones & Shipman, Ltd., Leicester, England.* (Vol.76,p. 295E.) 43.

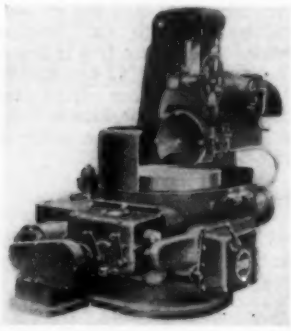
Three sizes of this automatic surface grinder are: working surfaces of 18x6 in., 18x8 in., and 27x8 in. Automatic cross feed range of the smallest is up to 0.125 in., table traverse being 153 in. per min. To obtain the cross feed the wheelhead is moved forward instead of the table. The wheel spindle is of nickel-chrome steel, carried in dust-proof adjustable phosphor-

bronze bearings. Sight-feed lubrication is provided. The back end of the spindle has an outboard journal bearing, while the wheel end is turned to a special taper so that the wheel flanges may be put on or removed quickly. One lever stops the automatic traverse at any point and engages the hand traverse. Standard rate of automatic traverse, about 12 ft. per min., may be modified. The machine may be countershaft driven or by motors for the wheelhead and for the traverse.

### Grinder, Surface, Vertical, Hydraulic

*Snow & Co., Ltd., Sheffield, England.* (Vol.76,p.214E.) 14.

Any annular surface, flat, convex or concave can be ground with precision. The column can be quickly adjusted to the required inclination. Settings can



be made to 0.00025 in. Vertical adjustment of the wheelhead is 12 in. Variable automatic down feed is provided at each stroke of the cross traverse of the wheel. Latter is obtained from a hydraulic unit. Worktable is 36 in. in diameter and has six speeds.

### Sharpening Machine, Broach

*Churchill Machine Tool Co., Ltd., Broadheath, near Manchester, England.* (Vol.76,p. 254E.) 31.

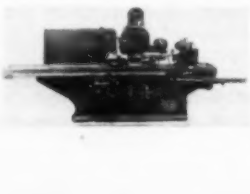
Sharpening and backing-off operations on broaches of all types can be undertaken. Motions are hand-operated. Both table and wheelhead move on ball-bearing rollers. Machine has 6 in. height of centers, admitting 60 in.; traverse 56 in.,

and wheelhead cross adjustment 10 in. Swivel adjustment of the wheelhead slide is graduated 10 deg. each side of zero; adjustment of grinding wheel spindle in the vertical plane, 90 deg. Cross-slide provides swivel adjustment in the horizontal plane.

### Grinder, Spline-Shaft, Triple-Wheel

*Churchill Machine Tool Co., Ltd., Broadheath, near Manchester, England.* (Vol.76,p. 508E.) 83.

By the triple truing method, spline-shaft grinding is completed at one setting, while the truing of the three wheels with a single device fixes the relation of the wheel diameters. Each wheel has a separate diamond and a gage. Gearing moves the three diamonds in unison. Spaced as required by distance pieces, the three wheels



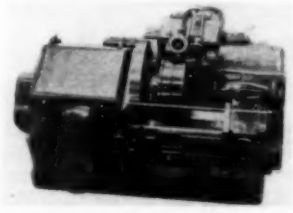
are clamped on a sleeve, the nest of grinding wheels on a collet thus forming a complete unit which can be kept for each type of shaft dealt with.

Spline-shaft grinders are available in three sizes, the smallest of which admits 18 in. between centers, grinding a length of 14 in., while the maximum traverse is 26 in.; largest machine takes 60 in. between centers, the maximum length ground being 52 in. All machines have hydraulic traverse.

### Grinder, Thread Lindner

*Stedall-Dowding Machine Tool Co., Clerkenwell, E.C., England.* (Vol.76,p.202E.) 10.

Made by Herbert Lindner, Berlin. Used for external and internal grinding of plug and ring gages, both taper and cylindrical. Drive is by hydraulic mechanism, and rapid motions are provided in both directions, engaged by an electric indexing mechanism. The leadscrew is driven off the work spindle by change gears and correcting gears, the latter pro-

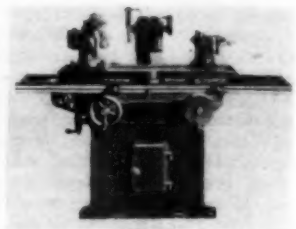


viding plus or minus movement in the pitch in thousandths of a mm. Feed for the pitch is effected by the grinding wheelhead, and for taper threads this head is moved radially to the work. An automatic device compensates for differences in the length of the grinding spindle. Both multiple- and single-profile grinding wheels can be used.

### Grinder, Tool

*Jones & Shipman, Ltd., Leicester, England.* (Vol.76,p. 255E.) 34.

This 12x20-in. universal cutter and tool grinder carries an 8 in. by ¾ in. wheel. Circular



adjustment of wheelhead is 260 deg. The table swivels. Wheel speeds are 3,150 and 4,900 r.p.m. The workhead spindle is hollow, one end is bored 3½ in. per ft., the other end No. 12 Brown & Sharpe. The workhead can be swivelled in the horizontal and vertical planes. The tailstock carries a lever-operated center, and the special tailstock at the left is used in conjunction with the right-hand tailstock for cutters mounted on arbors to obtain clearance and rake angles. A face mill grinding attachment takes cutters up to 21 in. A universal vise is supplied.

### Grinders, Portable, Pneumatic

*Loranco, Ltd., 42, Newlands Park, London, S.E., England.* (Vol.76,p.317E.) 50.

This portable air grinder is made in four sizes. It consists of an air turbine running at a very high speed from shop air supply of from 30 to 100 lb. per sq.in. Grinder bodies are made of a light alloy. Spindles are of steel and run in ball bearings. Size 1 weighs 11½ oz., and turbine speeds are from 40,000 to 60,000 r.p.m. This model can operate tools with 3-mm. shanks and grinding wheels up to 1 in. in diameter. The largest size, in the illustration, is made for machine use only.

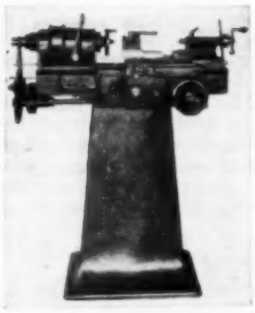
## Lathes

### Lathe, Engine, 20-In. Centers

*Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England.* (Vol.76,p.201E.) 8.

Design features include: arrangement of the bed with chutes so that chips fall clear at the back; totally inclosed, all-geared helically driven fast headstock with speeds suitable for tungsten carbide or high-speed steel tools, and a cascade oiling system to the headstock gears. Saddle, with back and

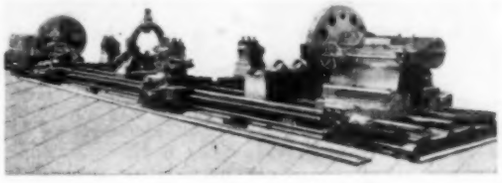
front rests, is controlled from one position. Swing, 31 in. over the saddles; length admitted with 24-ft. bed, 13 ft. 6 in. The spindle carries a 40-in. faceplate. Speed range, 2 to 137 r.p.m. Main drive is by 35-hp. variable-speed motor through three changes of gearing in the headstock, giving 80 changes with the shunt regulator.



### Lathe, Roughing, 50-In. Centers

*Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England.* (Vol.76,p.510E.) 86.

This machine will make the maximum use of high-speed steel or alloy cutting tools. It admits 60 ft. between centers and swings 80 in. in diam. over the saddles. Bed is of the four-shear type, 81 ft. long by 9 ft. 9 in. wide. It is built up of three lengths. The fast headstock is of the totally inclosed type, with a cascade lubricating system. All change gears are



interlocked. The spindle has a solid spigot and flange for locating and securing the faceplate, which is 8 ft. in diam. Drive is by a 75 to 120 hp. variable-speed motor and the range of spindle speeds is from 0.6 to 15 r.p.m.

Four saddles are provided, two at the front and two at the back. The front saddle has a compound slide rest with adjustable swivel slide, the top slide being adjustable transversely by hand. All saddles have self-acting reciprocating motion by screw and nut, with a self-acting sliding motion by rack and pinion and hand and quick power-traverse.

### Lathe, Sliding, 5-In. Centers

*Henry Milnes, Ingleby Lathe Works, Bradford, England.* (Vol.76,p.415E.) 68.

This 5-in. center lathe is made for truing-up commutators. The headstock spindle is bored $\frac{13}{16}$ in., while the center hole has a No. 3 Morse taper and the threaded nose has a plain portion to act as a register for the chuck. A single ball-bearing mounted pulley is used for drive. Spindle speed is 1,000 r.p.m. The upper part of the slide rest swivels, and the toolholder accommodates two tools. The apron carries suitable gearing to provide very fine feeds of over 200 cuts per inch and to give the requisite reverse motion.

### Lathe, Surfacing, 36-In. Centers

*Graham & Normanton, Halifax, England.* (Vol.76,p.246E.)

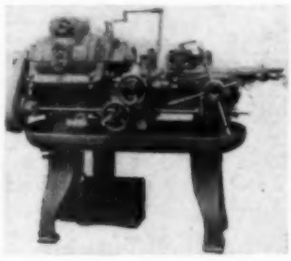
This 36-in. all-gear surfacing, boring and screw-cutting lathe embodies a gap bed having at the front an outer support for the saddle. It takes work 1 ft. 10 in. long between the chuck and tool turret. Spindle has a $3\frac{3}{8}$-in. hole for bar work. Eighteen spindle speeds are 9 to 460 r.p.m. in geometrical progression. Drive is by 5-hp. constant-speed motor. Quick-change gearbox provides 32 screw-cutting threads, ranging

from 2 to 28 threads per in., without loose wheels, and gives corresponding feeds from 10 to 140 cuts per in.

### Lathe, Capstan, with Motorized Spindle

*H. W. Ward & Co., Ltd., Birmingham, England.* (Vol. 76,p.304E.) 47.

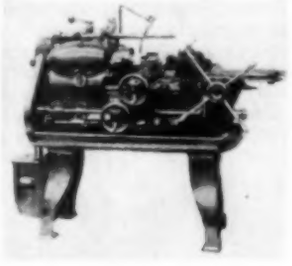
Intended for use on non-ferrous metals, this capstan lathe has the spindle forming the armature shaft of the motor. Four speeds can be obtained in both directions. These are 445, 705, 955 and 1,450 r.p.m. Speed change control is mounted on top of the headstock. Hole through the spindle is $1\frac{1}{8}$ in., and the lathe can be fitted with $1\frac{1}{4}$-in. automatic chuck and suitable bar feed motion, two-, three- or four-jaw chucks, or fixtures. The automatic chuck is fitted for rapid chucking of bars and tubes, or for second-operation work on short pieces. Automatic feeds of the capstan slide are fitted. Height of centers is $5\frac{1}{2}$ in., swing over cross-slide, $5\frac{1}{4}$ in., and total adjustment of saddle along bed, 6 in.



### Lathe, Capstan, Single-Pulley

*H. W. Ward & Co., Ltd., Birmingham, England.* (Vol. 76,p.334E.) 52.

The lathe is suitable for either chuck or bar work and can be equipped with a pneumatic or hand-operated chuck. Headstock allows rapid speed changing through friction clutches. There are six spindle speeds from 114 to 1,008 r.p.m. for general work and from 171 to 1,512 r.p.m. for high-speed work. An automatic brake is incorporated with the speed changing movement. A $1\frac{3}{8}$-in. hole through the spindle



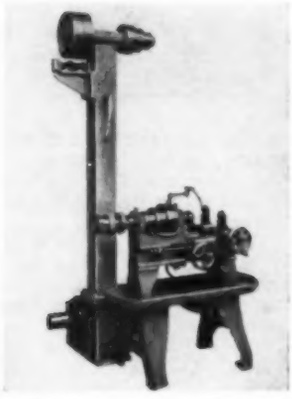
allows the use of $1\frac{1}{4}$-in. bars. Location of the single pulley at the headstock bracket makes the machine equally suitable for driving from the lineshaft or by motor through belt.

Automatic feed to the capstan slide is driven from a feed shaft along the front of the machine. Feeds are 80 and 165 spindle revolutions per inch of capstan slide travel. Height of centers is $5\frac{1}{2}$ in.; swing over cross-slide, $5\frac{1}{4}$ in., and total adjustment of saddle along the bed, 6 in. Distance between the front of the chuck and the capstan is 15 in.

### Lathe, Second-Operation

*Charles Taylor, Ltd., Birmingham, England.* (Vol.76,p.191E.) 1.

Electric unit drive is now furnished for the firm's 6-in. second-operation lathe through

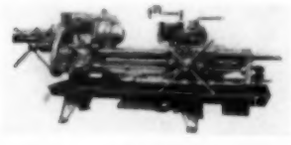


an electric motor mounted on a bracket at the base and driving to cone pulleys on the column. Countershaft is equipped with ball bearings. The shifting lever is just below the countershaft.

### Lathe, Turret, No. 5

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.193E.) 5.

Fully covered bed is featured, together with anti-friction bearings to all spindles, automatic lubrication, and speed and feed dials. Lathe admits $1\frac{1}{8}$-in. bars, greatest length turned being 27 in. Largest Whitworth thread with standard diehead, 1 in. Eight spindle speeds, forward and reverse, 46 to 750 r.p.m. Eight automatic feeds, 12 to 160 cuts per in. Drive—by pulley or by self-contained motor at the rear. Speed changes are effected through sliding gears. The geared draw-in chuck is operated by pilot wheel carried on the chuck bracket. It is self-adjusting for variations up to $\frac{1}{8}$ in. in diameter. Automatic bar feed is operated by an adjustable weight. In the hexagonal turret the tool holes are



relieved more than half the circumference to facilitate insertion and removal of tools. Quick power traverse is controlled by a lever on the front apron. Machine takes 5 hp.

### Lathe, Turret, Combination, No. 8

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.495E.) 81.

The lathe swings 17 in. over the bed covers and 9 in. over the cross-slide. Maximum distance from the end of the spindle to the face of the turret is 54 in. Hole through spindle is $3\frac{1}{4}$ in. The 16 spindle speeds range from 20 to 800 r.p.m. Both saddle and turret slide have eight feeds, from 11 to 161 cuts per in. The covered bed,

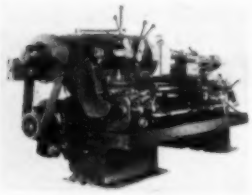
together with the ball and roller bearing spindle, insures permanent alignment of the lathe. Mechanism in the headstock is continuously lubricated.

The headstock can be driven by a single pulley or by a motor, self-contained. Saddle has reversible automatic longitudinal and transverse feeds driven by belt from the main spindle. Changes are made through sliding gears in the apron.

### Lathe, Turret, 17-In.

*G. Swift & Sons, Ltd., Halifax, England.* (Vol.76,p.527E.)

This lathe is built for using tungsten-carbide cutting tools and has a speed range suitable for machining all materials from hard steel to non-ferrous metals. It admits 3 ft. between the centers, 2 ft. 6 in. between the chuck face and the turret,



and swings 12½ in. diam. over the saddle. The 27 speeds range from 12 to 1,060 r.p.m., while a feedbox gives from 12 to 410 cuts per inch.

In the headstock the shafts run on ball bearings, and the spindle is mounted on precision Timken taper roller bearings. Reversing motion for sliding and surfacing is self-contained in the head and can be changed while the machine is running. The compound slides illustrated are specially designed for dealing with chucking work and forgings.

### Lathe, Forming, 14-In.

*C. Redman & Sons, Ltd., Halifax, England.* (Vol.76,p. 283E.) 38.

Forming, grooving and cutting-off operations on motor-car hubs are done on this lathe, which incorporates air chucking equipment and swings 14 in. over the bed and 9 in. over the cross-slide. Drive from the first to the second motion shaft

is by pick-off gears and final drive to the spindle is by worm-gear. Spindle has a 2 7/16-in. hole. The saddle has longitudinal hand adjustment, and a dead stop is fitted to the bed. Maximum distance from the spindle flange to the carriage is 8 in. Power cross-feed is provided by cam.

### Lathe, Shell-Turning, 75 mm.

*John Lang & Sons, Ltd., Johnstone, England.* (Vol.76, p.254E.) 33.

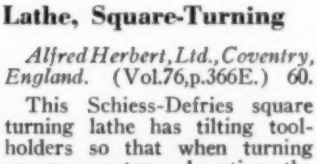
On test, this shell turning lathe, using a feed of 0.031 in. at 290 r.p.m., finished a 75-mm. shell in 65 sec. Lathe is 7½ in. height of centers, admitting 2 ft. 6 in. between centers. It is

designed for tungsten-carbide tools. Two spindle speeds are 270 and 290 r.p.m. Work is driven by a centered driver screwed into the nose of the shell. The saddle has two slides, each carrying a long forming slide.

### Lathe, Square-Turning

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.366E.) 60.

This Schiess-Defries square turning lathe has tilting toolholders so that when turning square or octagonal sections the tool will always stand at the correct cutting angle. The tilting movement of the tools is taken from an irregular shaped

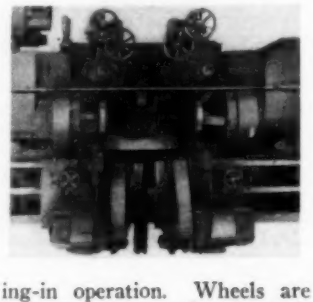


disk connected to the toolholder by a shaft running along the front of the bed in a connecting rod. The billet is carried by a special eight-screw chuck. Billets with different cross-sections can be machined by using the same cam. Straight, concave and convex sided pieces can be machined. Taper or parallel circular turning is possible. A device for removing faulty spots in billets is available. Height of centers, 2 ft. 11½ in.; length of billets taken, 6 ft. 6¾ in.; square section across flats, 2 ft. 5¼ in.; distance between chuck and tailstock center, 9 ft. 2¼ in.

### Lathe, Wheel, and Grinder, 4-Ft.

*Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England.* Vol.76,p.192E.) 3.

Turning and grinding new car wheels or re-turning and grinding used wheels, both at one setting of the work, is accomplished. Grinding the treads permits non-ferrous brake blocks to be used. Faceplates are 4 ft. in diameter, and both headstocks are arranged to traverse. Wheels are raised by a motor-driven jack. Rails facilitate the roll-

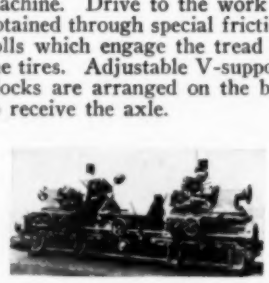


ing-in operation. Wheels are located by their axles, journals gripped by tapered collets. Pneumatic clamps lock the headstocks. Faceplate speeds are 1.1 to 10.5 r.p.m. by a two-step gearbox and variable-speed main driving motor. Feed to the rests is provided by a rocking shaft, which operates reversible ratchet boxes. Four steps are ⅛, ¼, ⅜, and ½ in. per revolution. Grinding wheels are 28 in. by 4 in.

### Lathe, Re-turning and Burnishing, Axle-Journal

*Craven Bros. (Manchester). Ltd., Reddish, Stockport, England.* (Vol.76,p.462E.) 76.

Re-turning and burnishing both outside axle journals simultaneously is done on this machine. Drive to the work is obtained through special friction rolls which engage the tread of the tires. Adjustable V-support blocks are arranged on the bed to receive the axle.



Saddles are fitted with front tool rests which carry the journal turning tools. The rear portion of each saddle is fitted with a burnishing attachment having three special hardened steel rollers. Drive is from an 8-hp. constant-speed motor. One-shot pressure pumps are used for lubrication. Height of centers is 13 in.

### Lathe, Wheel, 7-Ft.

*Craven Bros. (Manchester), Ltd., Reddish, Stockport, England.* (Vol.76,p.478E.) 79.

Each headstock spindle has sliding inside it a hollow steel barrel 11½ in. in diam. arranged at the front end to receive collapsible cone bushings to carry tender axles with outside journals by the journals. The spindles are also provided with adapters and steel centers to carry engine wheels with inside or outside journals. Main drive

is by a 50-hp., two-speed a.c. motor mounted on the headstock. Faceplate speeds are suitable for turning speeds of about 10 to 20 ft. per min. on wheels from 2 ft. 8 in. to 6 ft. 8½ in. diameter on the tread.

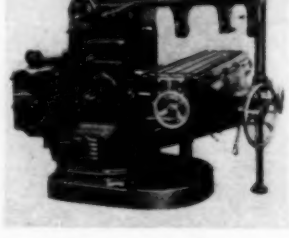
The two front slide compound rests have each a toolholder slide fitted with a massive steel lever, pneumatically operated, for rapidly clamping the removable tools. The toolholder can be swiveled to suit the taper of the wheel tread. Each rest is arranged with variable self-acting feed motion, to traverse either together or separately. Feeds range from ⅛ to ½ in. traverse per revolution of the faceplates. Length of axles admitted ranges from 5 to 8 ft. Maximum distance between the faceplates is 10 ft.

## Milling Machines

### Milling Machines, Plain and Universal

*J. Parkinson & Son, Shipley, England.* (Vol.76,p.215E.) 16.

Illustrated is the No. 3 size plain machine which has table measurements of 70 by 16½ in. overall with movements of 40 by 12 by 18 in. Universal machine has a table 57 by 14 in. overall with movements of 36 by 12 by 18 in. Sixteen spindle speeds range from 17 to 450 r.p.m., and 16 rates of power feed from ⅛ to 14⅜ in. per minute. Quick power traverse is 76 in. longitudinally, 57 in. cross and 27 in. vertical. Attention has been paid to the easy manipulation of the speed and

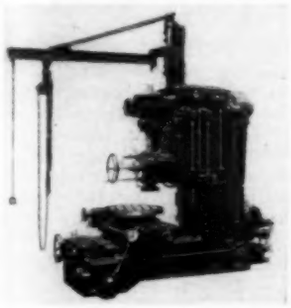


feed changes to table movement controls, to knee bracing, and to the rectangular cross-section overarm. Three outer arbor supports are fitted. Drive may be by belt or by motor of 7½ hp. or 10 hp.

### Milling Machine, Vertical, Heavy

*Cunliffe & Croom, Ltd., Broughton Iron Works, Manchester, England.* (Vol.76,p. 284E.) 39.

The machine uses over 100 anti-friction bearings and is built for tungsten-carbide milling cutters. Controls are centralized. Drive is from a 20-hp. motor at the back. Final drive to the spindle is by worm gear.



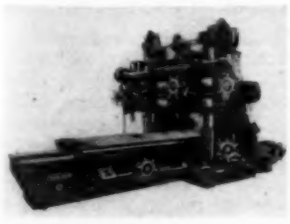
Eighteen speed changes are 12 to 397 r.p.m. The brake stops the spindle.

Quick and slow hand traverses for the spindle head are fitted, and an adjustable depth stop is placed at the side of the head. A worm-geared pulley block of one-ton capacity serves both sides of the machine. Spindle speeds: 18 steps, 12 to 397 r.p.m.; table feeds: 18 steps, 1½ to 20 in. per min.; working surface of rectangular table, 88 by 95 in.; diameter circular table, 38 in.; optional square table, 36 in. and indexes 90 deg.; automatic longitudinal feed, 62 in.; automatic cross feed, 38 in.; vertical adjustment of spindle head, 21 in.; distance from table to spindle nose, 28½ in.

### Milling Machine, Planer-Type

*Kendall & Gent, Ltd., Manchester, England.* (Vol.76,p. 265E.) 35.

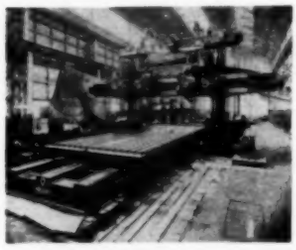
The planer machines work of irregular shape in quantities by means of formers. The former plate is bolted on the table and the left-hand vertical saddle carries an adjustable roller. The profiling motion is readily disconnected. Milling capacity is 3 ft. 8 in. wide by 10 ft. 6 in. long by 2 ft. 6 in. high. Hand and variable self-acting reversible feed motion is provided, with quick power traverse for setting purposes. Table is driven by a long worm engaging with a semi-circular rack. The cross-slide can be elevated by hand or power. Large-face milling cutters are mounted on the spindle nose and driven by key inserts on the flange. Drive is by motor and nine-speed gearbox.



### Milling Machine, Planer-Type

*Kendall & Gent (1920), Ltd., Manchester, England.* (Vol.76, p.382E.) 61.

Heavy castings and components for large Diesel engines, locomotives and similar work is the field of this planer-type milling machine which deals with work 12 ft. wide, 8 ft. high by 28 ft. long. Two vertical spindles are located on the cross-slide and one on each upright. The left-hand vertical spindle and left-hand horizontal spindle will swivel 20 deg. each side of the center line.



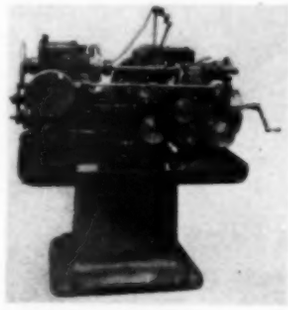
The bed is 53 ft. long. Hand and variable self-acting reversible feed motion is provided, together with quick power traverse. Motion to the table is transmitted by long twin worms. The cross-slide is elevated by a reversible motor. Vertical saddles are provided with hand and variable self-acting reversible feed motion, together with rapid traverse. Controls are operated from the platform. Driving motion to the spindles is obtained by separate motors of 30 hp., having a speed variation of 4 to 1. The main driving motor is 60 hp., with speed variation of 4 to 1. Feed motions to the table and saddles are obtained from a 20 hp. reversible motor coupled by Texrope drive to a gearbox providing nine feeds to each spindle speed.

### Milling and Hobbing Machine, Thread

*J. Holroyd & Co., Ltd., Milnrow, England.* (Vol.76,p.204E.) 12.

Developed for thread-milling right- and left-hand screws and worms, and hobbing spur, spiral and worm gears, and cutting splines and hexagons. Hobs or cutters can be held in the cutter head, and the whole can be swung 180 deg. for right- and left-hand components. Inward adjustment to depth of cut is provided by micrometer setting and dead stop. Drive is obtained from a reversing countershaft and four-speed cone, with two-speed gear and gearing to the spindle. The cutter-head saddle carries an adjustable V-steady for supporting the work directly behind the cutter. Multi-start worms and threads can be cut without losing pitch after indexing.

For thread-milling, the work-spindle drive is obtained by a single pulley from the countershaft, so that the cutter speeds can be varied independently of

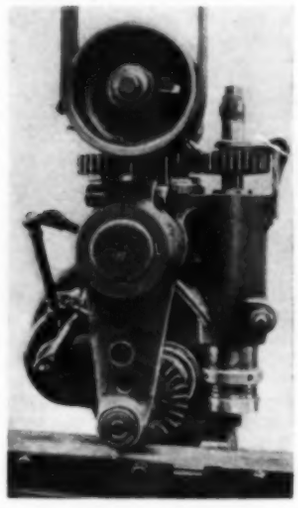


the work speeds. Multi-start threading is done by means of an index plate on the work spindle. Maximum and minimum diameters of thread-milling work are 3 and ⅛ in. Work feeds range from 1 to 12 in. per min., and work speeds from 0.127 to 7.62 r.p.m. Maximum and minimum leads are 3 and 1/20 in., and maximum pitch ¼ in. In spur and spiral gear hobbing the maximum diameter of work is 6 in. Spur gears with teeth from 150 to 2 can be cut.

### Milling Attachment, Vertical

*Loranco, Ltd., 42, Newlands Park, London, S.E., England.* (Vol.76,p.352E.) 57.

The attachment clamped on 3-in. arm support affords two speeds—800 r.p.m. for small diameter end mills, and a low-speed for 4 in. mills. Driving shaft runs in ball bearings, and is provided with a worm for the slow speed and bevel gears for the high speed. An independent vertical adjustment is provided for the vertical spindle. The attachment can be set to various angles and may be moved along the arm. With it, T-slots can be machined at one setting and transverse slots on faces can be cut. Keyways, roughed with the horizontal cutters, may have their ends cut with end mills.

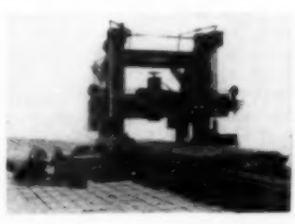


## Planers and Shapers

### Planer, High-Speed

*Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England.* (Vol.76,p.233E.) 22.

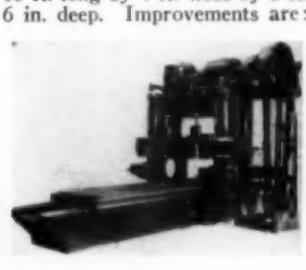
Work 5 ft. sq. and 16 ft. long is accommodated. Two tables are 8 ft. long and may be coupled. Cutting speeds range to 150 ft. per min., and return speeds up to 200 ft. per min. Table drive is by a 40-hp. motor. A device is fitted to the table control for locally accelerating when gang planing, and the traverse is arranged to give slow entry and exit of the tools on both cutting and return stroke. This feature allows the use of tungsten-carbide tools, and enables the machine to plane up to blank faces. Feed is variable from 3/32 to 2 in. both on the vertical motion of the side boxes and the horizontal motion of the cross-rail boxes. Vertical feeds from 3/32 to ¾ in. are provided for the cross-rail boxes.



### Planer

*Summerskill Bros., Sowerby Bridge, Yorks, England.* (Vol. 76,p.304E.) 46.

Machine planes work up to 10 ft. long by 4 ft. wide by 3 ft. 6 in. deep. Improvements are:

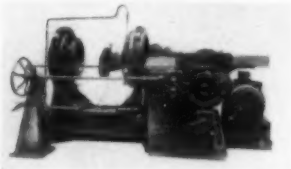


a quick power traverse motion to the two toolboxes on the cross-slide with independent feed to each box; quick power elevating motion to the cross-slide, and balanced side tool-boxes fitted with an extra slide. Drive is by a 15-hp. constant speed motor. Three cutting speeds are 25, 35 and 45 ft. per min., with a constant return of 100 ft. per min. Tool-boxes on the cross-slides are entirely universal, with automatic feed from 0 to ¾ in. in any direction, and are graduated for swiveling.

### Shaper, Draw-Cut, Special-Purpose

*Butler Machine Tool Co., Ltd., Halifax, England.* (Vol. 76,p.235E.) 25.

This 48-in. stroke electric shaper is employed for machining flat pole seatings inside the yokes of electric motors. It is of draw-cut design, and an adjustable table provides maximum and minimum distances of 3 ft. 2 in. and 2 ft., respectively. Two trunnions mounted on the table support the motor yokes. The outer trunnion is adjustable along the table. After one seating has been machined, the trunnions are revolved by pilot handle to the next pole or interpole seating. Seatings up to 48 in. long can be dealt with. Depth of cut is obtained from the tool box.



### Shaper, Draw-Cut, Portable

*Butler Machine Tool Co., Ltd., Halifax, England.* (Vol. 76,p.384E.) 62.

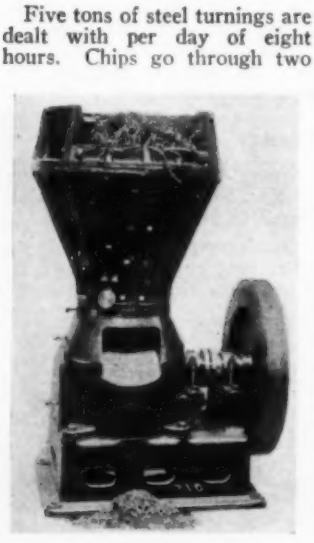
This 48-in. shaper is designed primarily for portable use in heavy forge shops for re-truing the anvil seatings of large hammers and presses. A 10-ft. bed is made in two halves. The top half carrying the 4 ft. wide saddle is entirely self-contained and can be transported by an overhead traveling crane, leaving the bottom bed with its worktable on the foundation. The saddle at the front of the bed carries the worktable 30 in. deep, which has a top working surface of 40x34 in. The ram is driven by a 15-hp. motor. Cutting speeds range from 20 to 70 ft. per min. Stroke is 4 ft. 4 in.; cross-traverse, 6 ft. Distance from the underside of the ram to the floor line is 5 ft.

## Other Machines

### Crushing Machine for Steel Turnings

*Carter & Wright, Halifax, England.* (Vol.76,p.201E.) 7.

Five tons of steel turnings are dealt with per day of eight hours. Chips go through two sets of knives and then down a discharge chute. The side of the hopper is fitted with removable sections, so that tools or workpieces can be recovered. A safety shearing device operates if a solid object fouls the knives. Machine takes 4 hp.

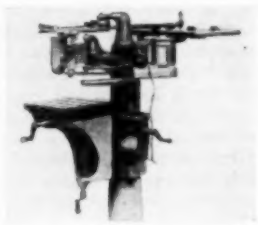


### Engraving Machine, Motor-Driven

*Taylor, Taylor & Hobson, Ltd., Stoughton Street Works, Leicester, England.* (Vol.76,p. 430E.) 70.

Machine employs a pantograph for reproduction to any suitable scale. The improvement consists in incorporation of a light vertical-running high-speed universal type of motor, mounted on a special linkage, which takes the place of the older system of guide pulleys. The motor drives through a short belt.

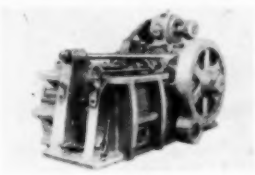
A 12-in. circular worm-operated table is specially arranged to clamp to the engraving machine table, and is suitable for a variety of light milling and machining operations, as well as for indexing and engraving. Four T-slots are cut in the upper surface.



### Forging Machine, Precision

*J. Bigwood & Son (1930), Ltd., Wolverhampton, England.* (Vol.76,p.509E.) 85.

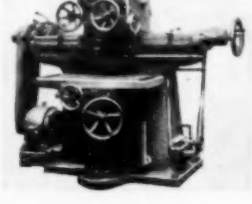
These machines are for material up to 2 in. in diam., the stroke being 9 in., the gather 6½ in., the die opening, 3¾ in., and number of strokes per min., 55. The machine enables the preparation and finishing of large upsets and awkward-shaped forgings at one handling and one heat. It is further stated that the machine can be used advantageously where only 10 or 15 forgings of a size are required. The long hanging heading slide moves on narrow guides, insuring registration with the dies. The die slide is operated from a separate cam on the crankshaft through a double toggle joint, insuring accurate action over the full length of the dies and avoiding the production of excessive fins. The horsepower required is 18, and net weight is 19 tons.



### Keyseating Machine, Vertical, One-Cut

*George Richards & Co., Broadheath, near Manchester, England.* (Vol.76,p.511E) 87.

This vertical keyseating machine cuts keyways up to 30 in. long by 2 in. wide. It works on the one-cut system, no previously drilled hole being necessary. Down feed is engaged by a lever, and this, at the required depth of feed, automatically falls to engage the horizontal feed, the vertical feed being simultaneously stopped. Then, at the required length of slot, the lever falls to the feed disengaged position, when the horizontal feed is also tripped. The spindle is adjustable 5½ in. vertically. The table measures 36x12 in., can be adjusted 14 in. vertically, and has a cross-adjustment of 5½ in. Maximum distance between the spindle nose and the table is 18 in.

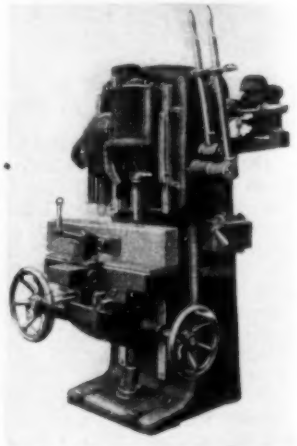


### Mortising Machine, Combined Chain and Chisel

*Wadkin & Co., Green Lane Works, Leicester, England.* (Vol.76,p.365E.) 59.

In this mortising machine the chain and chisel headstocks are mounted side by side on the front of the main frame. The chain headstock is operated by the right-hand lever, and the motor for driving the mortise chain is mounted directly on the spindle and has ball bearings. The chain runs only when actually cutting.

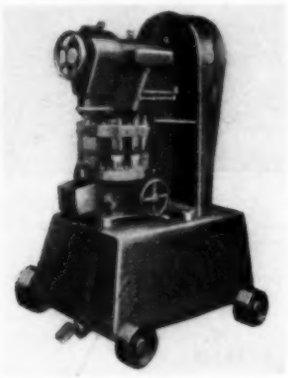
The hollow chisel headstock has a blower built in for removing chips. An automatic stop attachment is obtainable on special order. The standard machine will take timber up to 12 in. deep by 8 in. wide and cuts mortises of 1¼ by 3 in. to a depth of 6 in. by chain. The chisel can be used to cut 1 in. in soft wood or ¾ in. in hard. The table is 2 ft. 3 in. long.

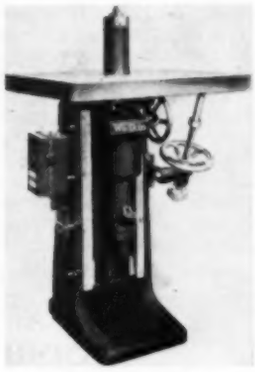


### Pointing Machine, Bolt, "Calow"

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.246E.) 28.

This shanking and pointing machine is used in connection with a thread rolling machine described June 25, page 227E. See page 65 of this issue. Three sizes are built, the smallest having two spindles suitable for bolts up to ⅞ in. in diameter, output being 16 per



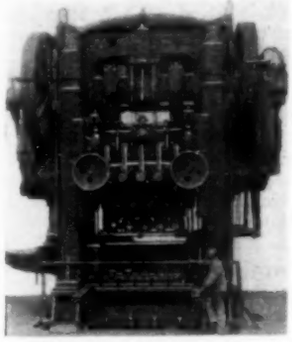


min. The largest machine has three spindles and it takes bolts up to 1 in. in diameter, the output being 10 per min. Power required is 3 hp. The purpose of the machine is to point and reduce the shanks of bolts, the operations being performed simultaneously.

### Press, Crank, Automatic, Multi-Tool

*Hiltmann & Lorenz, Aue., Germany.* (Vol.76,p.330E.) 51.

With this automatic press five progressive tools perform successive operations, such as blanking, drawing, trimming, flanging, piercing, punching, embossing, and others during one stroke of the ram. In connection with an automatic strip-feeding mechanism which feeds the strip to the first die, and an automatic work-gripping and feeding device which carries the work to the various successive tools and locates the same under the latter, the machine is fully automatic in operation, five completed pieces leaving the press per minute.



For handling previously blanked pieces, the automatic strip-feeding mechanism is replaced by an automatic dial feed and the work pieces which require 10 or 15 stages with intermediate annealing operations may be finished on the same press.

### Punch, Power

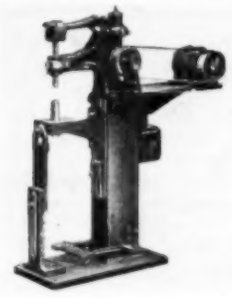
*S. Wolf & Co., Ltd., 115 Southwark St., London, S.E., England.* (Vol.76,p.267E.) 37.

The Eda multiple power punch exerts a maximum pressure of 30 tons and will punch $\frac{3}{8}$-in. holes in mild steel plate up to $\frac{1}{2}$ in. thick, or 1-in. holes in $\frac{3}{8}$-in. plate. Depth of throat is 4 in.; length of stroke, $\frac{3}{4}$ in.; number of strokes per min., 28. The rotating head carries twelve punches of different sizes.

### Riveting Machine, Motor-Driven

*B. Elliott & Co., Ltd., Belle Isle, York Road, London, N., England.* (Vol.76,p.463E.) 78.

Three sizes are designed for heading tight or loose rivets cold. The largest machine (shown) is of telescopic design, the lower member being bolted to the base of the column. An upper part bolts into notches which give the necessary height adjustment, and the top is attached to an anvil. The anvil is carried by a bracket bolted to a machined face at the front of the column. By varying the foot-pressure on the pedal, the hammer-blows can be graduated from soft to hard. The hammer spindle has a combined reciprocating and rotary movement. Maximum rivet capacities (soft iron) are respectively, $\frac{5}{32}$, $\frac{1}{4}$ and $\frac{1}{2}$ in.



### Sanding Machine, Vertical

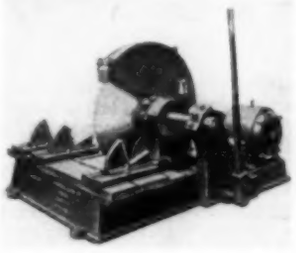
*Wadkin & Co., Green Lane Works, Leicester, England.* (Vol.76,p.479E.) 80.

This machine will deal with either inside or outside curves. The sanding bobbin is driven by an electric motor built directly onto the vertical spindle, while a reciprocating motion is given to the bobbin by means of a worm and wormwheel drive. The table tilts 30 deg. below and 10 deg. above horizontal. The machine will treat material of a maximum depth of 8 in. Dimensions of the bobbin supplied are $3\frac{1}{2}$ in. in diam. and 9 in. long. The table is 2 ft. 2 in. by 2 ft. $1\frac{1}{2}$ in.

### Sawing Machine, Hot

*S. Russell & Sons, Ltd., Leicester, England.* (Vol.76,p.245E.) 27.

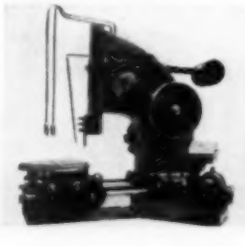
Two sizes added to the line have 36 and 18 in. blades. The larger will cut bars and sections up to 6 in. round or square; the smaller, $2\frac{3}{4}$ in. A sliding table carries adjustable V-rests for holding the material during the sawing process, the table being operated by hand lever. Table of larger machine is 4 ft. 6 in. long by 1 ft. 4 in. wide. Machine takes 15 hp. On the 18-in. machine, the work is stationary, and the saw spindle and motor are mounted on a sliding carriage.



### Slotter, High-Production, 28-In. Stroke

*Butler Machine Tool Co., Ltd., Halifax, England.* (Vol. 76,p.509E.) 84.

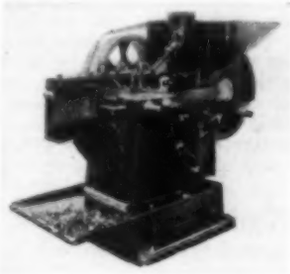
This machine is built for producing a high-class finish on rough machined castings. Drive is by 2 to 1 variable-speed motor, which, in conjunction with a six-speed gearbox, gives a number of cycles between 3.5 and 27 per min. The feed unit is fastened to a baseplate, and consists of a 4-hp. constant-speed reversing motor which operates both feeds and power traverses. Ten feeds are from 200 to 10 cuts per in. Two interlocked pendant switches for the ram and feed motors control the machine. The worktable has power traverse in all directions, and electric trips are fitted on all traverses.



### Thread-Rolling Machine, Automatic, "Calow"

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.227E.) 21.

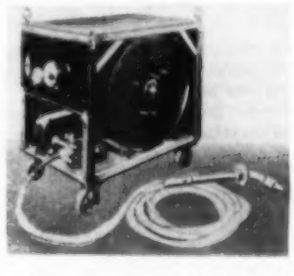
This machine is built by Th. Calow & Co., Bielefeld. It is available in three standard sizes for threads up to $\frac{3}{4}$-in. diameter by $2\frac{7}{16}$ in. long. Rolling dies work horizontally to give greater simplicity. One bolt passes through at each stroke of the die slide. Bolts that break are pushed between the dies by means of a special device, while correctly rolled screws are thrown out by an automatically controlled ejector.



### Welder, Arc, Continuous-Feed

*Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, England.* (Vol.76, p.220E.) 18b.

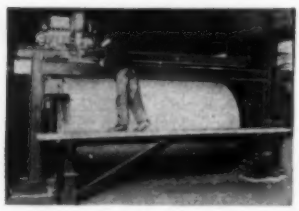
In this continuous feed welder the rate of feed can be controlled directly by the operator. A drum of electrode wire is fed by rollers through a hollow, steel-covered, flexible copper conductor, at one end of which is attached an electrode guide. A contactor in the arc circuit switches on the feed motor so that when the arc is broken the feed is discontinued. Another switch permits the operator to stop the motor. The outfit is mounted on wheels for portability.



### Welding Machine, Seam, Arc

*Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, England.* (Vol.76, p.220E.) 18a.

The two edges of the shell are secured rigidly against the top clamp of a steel gantry by an internal backing bar operated pneumatically. The carriage bearing the welding head moves parallel with the seam on a steel track. Included in the

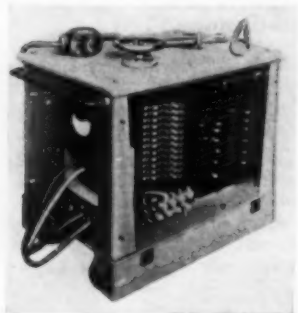


lower beam or clamping member are a copper chill bar and an insulated copper conductor. For circular welding the work is mounted on a rotating device driven by a motor. The automatic welding head has a small constant-speed motor that drives a pair of electrode feed rollers.

### Welding Set, Arc, Atomic-Hydrogen

*Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, England.* (Vol.76, p.220E.) 18c.

An alternating current arc is maintained between tungsten electrodes around which hydrogen gas is passed. The heat of the arc breaks up the molecules of hydrogen into atoms, and



heat emitted by the hydrogen as it recombines is used to fuse the metal to be welded. The tungsten electrodes merely establish and maintain the arc. The electrode holder is manipulated like a gas torch, and a filler rod may be used to build up the weld to the size required.

### Weighing Machine, Automobile

*W. & T. Avery, Ltd., Soho Foundry, Birmingham, England.* (Vol.76,p.351E.) 56.

This machine determines the weight impressed upon roads by any one wheel of any road vehicle in accordance with the Road Act of 1930. It is essentially a miniature weighbridge, working on the lever principle, and is constructed of aluminum alloy and steel. The weighing platform is 3 in. from the ground and has ramps to get the wheel in position. The device carries a load of 7 tons. The dial is of the revolving pattern and is totally inclosed. The dial face is inclined so that

the graduations can be quickly read. The weighing machine is largely built of aluminum.

## Small Tools

### Centers, Milling Machine

*John Ackworthie, Ltd., Coleshill St., Birmingham, England.* (Vol.76,p.254E.) 32.

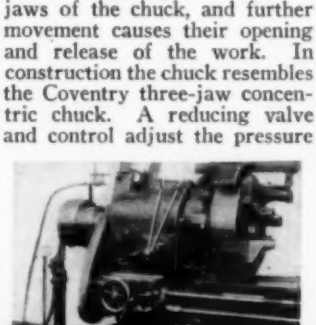
Of the two sizes, the smaller takes 6½ in. between centers and work up to 3¼ in. diameter, the maximum hole through the collet chuck being ½ in., and the self-centering chuck (when used) 3 in. The larger appliance will take 12 in. between centers and will hold work 4½

in. diameter, the maximum hole being ⅝ in., self-centering chuck 4 in., over-all length and width of base 21x7 in., and weight, 60 lb. Centers are quickly fixed or removed from the machine table. Indexing is done by lifting the lever over the head and revolving by gripping the knurled ring at the back. The index plate will have 2, 3, 4 or 6 divisions.

### Chuck, Air-Operated, 32-In.

*Alfred Herbert, Ltd., Coventry, England.* (Vol.76,p.316E.) 49.

This chuck is pedal-actuated to permit the operator to have both hands free. Partial depression of the pedal closes the jaws of the chuck, and further movement causes their opening and release of the work. In construction the chuck resembles the Coventry three-jaw concentric chuck. A reducing valve and control adjust the pressure

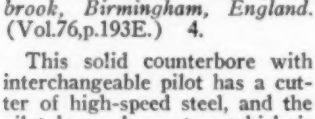


on the jaws to avoid distortion of the work. The chuck can be adapted to the firm's No. 24 and No. 21 turret lathes. The jaws can quickly be set to position and setting gages are available. Within the air circuit an air filter is incorporated to remove foreign matter. The chuck can be adapted to any large turret lathe or engine lathe with a hollow spindle.

### Counterbore with Interchangeable Pilot

*B.S.A. Tools, Ltd., Sparkbrook, Birmingham, England.* (Vol.76,p.193E.) 4.

This solid counterbore with interchangeable pilot has a cutter of high-speed steel, and the pilot has a long stem which is



secured by an Allen-type setscrew. Pilot can be adjusted. Six sizes range from ⅜ to 1½ in. diameter, and pilots from 7/16 to ¾ in.

### Dresser, Abrasive-Wheel, "Peristat"

*Wearden & Guylee, Ltd., Bradford, England.* (Vol.76,p. 216E.) 17.

Description of the dresser is found on page 306E, of July 18, 1931, issue. A tungsten-carbide tip is now fitted and can be adjusted to protrude about 1 mm. in front of the dressing blade. The attachment is fitted at the

side of the dresser and can be lifted clear. It removes the microscopic points left on the wheel face after it has been dressed with the cutting blade. The length of projection of the tip is adjustable.

### Hand Tool, Multi-Purpose

*James Neill & Co. (Sheffield), Ltd., Sheffield, England.* (Vol.76,p.414E.) 67.

The multi-purpose hand tool (*AM*—Vol. 75, p. 213E) has been improved and now includes six sawing blades, six slotting blades, two engineers' scrapers, a belting and lead slitting knife, and a second-cut, general-purpose file with one safe edge. For undercutting mica on commutators, the tool is now particularly suitable on mica of less than 23 gage.

### Hone Cylinder, "A.B."

*George H. Alexander (Machinery), Ltd., Coleshill St., Birmingham, England.* (Vol. 76,p.431E.) 71.

This "A.B." cylinder hone has a balanced cone mechanism which, while permitting freedom of cones to float and compensate for taper bores or uneven stone wear, prevents accidental displacement of the cone assembly when entering the hole

or when changing stones. The tool is fitted with a telescopic driving tube or universal, from which the hone is detachable at the lower end. An improved control brake gives sensitive control. Two standard bodies cover the following ranges: 2⅛ in. to 4 in. diam. with two sets of plain flanges, and 2⅞ in. to 6 in. diam. with two sets of plain flanges.

### Toolholder with Circular Cutter

*Martin, Wyvill & Co., Mowbray St., Sheffield, England.* (Vol.76,p.448E.) 75.

This toolholder has a circular cutter for economy of high-speed steel. The particular feature is the taper pin lock device for securing the cutter in

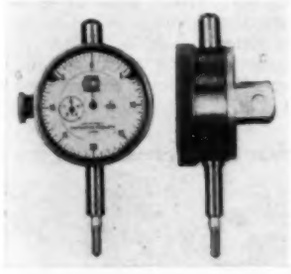
the holder. It is merely necessary to tap out the pin and rotate the cutter, thus presenting a new cutting edge to the work without removing the toolholder. The cutter can be reground. Three sizes are ¾ in., 1⅛ in., and 1⅜ in. diam. The holder is of heat-treated alloy steel. A No. 2 size tool will take a cut ½ in. deep at a feed of ⅛ in. per rev. on tough manganese steel without chatter or strain. Cutting compounds must not be used because the tool works best when hot.

# Gaging, Inspecting and Measuring Equipment

### Indicator, Dial

*Engineering Products, Ltd., Aldwych House, Aldwych, London, W.C., England.* (Vol.76, p.234E.) 23.

The Ace dial indicator is sturdily built and has a clock movement. Movement of the contact spindle is 0.4 in. or 10



mm. Tolerance marks are provided and are easily adjusted by a serrated ring.

### Indicator, Dial, "Mercer"

*J. E. Baty & Co., 39 Victoria St., London, S.W., England.* (Vol.76,p.447E.) 72.

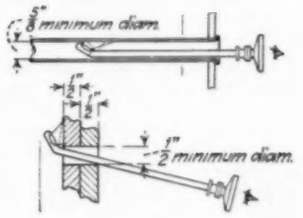
This dial gage is made by T. & F. Mercer, St. Albans, and has an outside diameter of 2⅞ in. The dial is adjustable by a knurled ring at the front. It is graduated 0-50-0 or 0-100, each division reading 0.001 in.

A tell-tale small counter is provided to register the number of revolutions of the large pointer. The spindle has a range of ½ in. on ordinary English and metric indicators.

### Inspection Instrument, Internal

*Foster Instrument Co., Letchworth, England.* (Vol.76,p. 526E.) 89.

The Introscope Minor has been introduced, having a simplified lens system suitable for

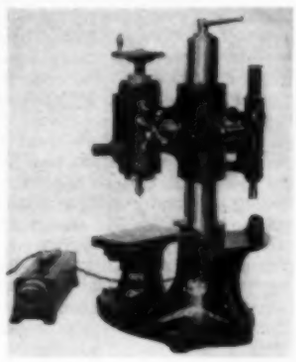



cases where the size of the aperture compared with the depth at which examination is required is such that the extremely fine and complicated lens system, such as used in the higher grade Introscope, is not required. One standard size Minor instrument is made at present, having an effective length of 9 in. and suitable for insertion into straight tubes of internal diameter of not less than ⅝ in. The instrument is actually ⅝ in. in diam.

### Hardness Tester, "Firth Hardometer"

*Thos. Firth & John Brown, Ltd., Atlas & Norfolk Works, Sheffield, England.* (Vol.76,p. 335E.) 53.

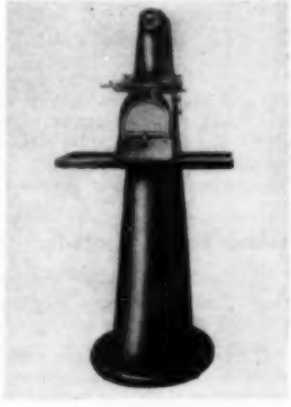
By improved construction it is now possible to register the microscope scale rapidly over indentations made with the 10 kg. load machine when using the micro-projection head, and determinations made in this way afford greater reliability. The pillar can now be locked quickly at either of two desired terminal positions by the central locking device at the top of the column. The base now has a three-point bearing, and the star handle for raising and lowering the load cylinder head gives greater rapidity of operation.



### Projection Instrument, Thread

*Atkins (Peterborough), Ltd., Old Fletton, Peterborough, England.* (Vol.76,p.285E.) 40.

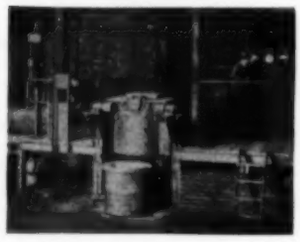
Work centers are carried by cross-slides mounted on ball bearings. Slide in line with the axis of the work is under control of a 1-in. micrometer. A 1-in. standard block is provided for measuring the pitch of one inch of thread in conjunction with the micrometer. A darkened room is not necessary. Magnifications are 50 to 1 and 25 to 1. The former is for screws up to 8 per in. pitch and the latter for 4 per in. Capacity, work up to 3 in. in diameter.



### Furnace, Melting, Electric, High-Frequency

*General Electric Co., Ltd., Magnet House, Kingsway, London, W.C., England.* (Vol.76,p. 295E.) 42.

The Witton high-frequency induction furnace has the advantage that in it steel and other alloys are melted under conditions which insure that the product is identical in composition with the arithmetical sum of the materials charged into

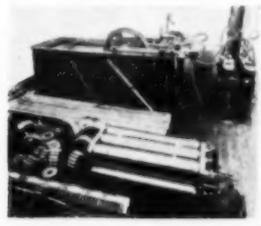


the furnace. The charge cannot take up sulphur or carbon, and injurious non-metallic oxides are eliminated. Automatic control simplifies the operation.

### Hardening Machine, Gear, "Shorter" Process

*Patent Gear & Metal Hardening Co., Ltd., 69, Horseferry Road, Westminster, S.W., England.* (Vol.76,p.400E.) 65.

The machine is capable of hardening gears up to 7 ft. 4 in. in diameter by 24 in. tooth face and circular pitches from ⅜ to 4½ in. and more. The object of the machine is to locally harden



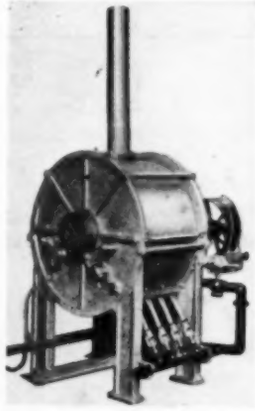
the wearing surfaces. Hardening is effected by mechanically operating an oxy-acetylene flame on the area under treatment, and by following this with a cooling jet to quench the heat. It is said that mild steels of 0.45 per cent carbon can be brought to over 600 Brinell by the process. Running along each side of the tank are two ground tubular members which take the head carriage by means of side brackets which slide on the tubes. Two cross-bars provide bearings for the cross-movement of the operating head.

# Miscellaneous Equipment

### Blueing Barrel, Gas-Heated

*Brayshaw Furnaces & Tools, Ltd., Hulme, Manchester, England.* (Vol.76,p.496E.) 82.

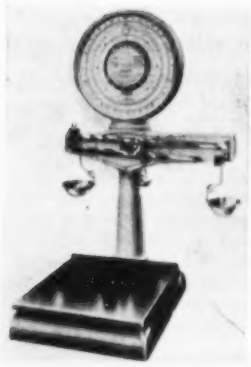
This barrel furnace is for the blueing of small parts. It consists of a mild steel cylindrical body and cast-iron end plates, lined with insulation. Inside is a mild steel rotating barrel with inside measurements of 30 in. diam. by 15 in. deep. Heating is effected by four natural-draft burners at each side. The charge can be dumped speedily through the bottom.



### Scale, Weighing and Counting

*W. & T. Avery, Ltd., Soho Foundry, Birmingham, England.* (Vol.76,p.399E.) 64.

Weighing, counting and computing for piecework, stock and



packing are functions of this scale. Ratios are 70 to 1, 99 to 1, 72 to 1, and 100 to 1. By placing a single article in the left-hand scoop and using the selected weighing ratio, the number of parts in the right-hand scoop can be determined. The scale can be used for ordinary weighing purposes.

## Bearing Units, Ball and Roller

*Hoffman Mfg. Co., Ltd., Chelmsford, England.* (Vol.76, p.194E.) 6.

Known as "Sun and Planet" friction eliminators, these ball and roller bearing units provide a contact or load ball or roller to which the moving element is applied direct, so located as to revolve freely about its own axis and superimposed eccentrically above and in contact with a freely rotating raceway or track, anti-frictionally mounted in a self-contained housing. Fig. 1 shows a unit to carry loads from 250 to 6,000 lb. and designed to operate with reciprocating mechanisms. Fig. 2 shows a simple roller form to carry loads from 1,500 to 7,500 lb. The unit can be applied to sliding and reciprocating mechanisms, turntables for cranes and other purposes, conveyors, mechanical casters, elevators, sliding parts on drilling machines, lathes and other machine tools. Pressure lubrication is provided.

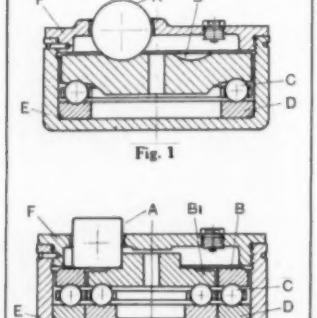


Fig. 1

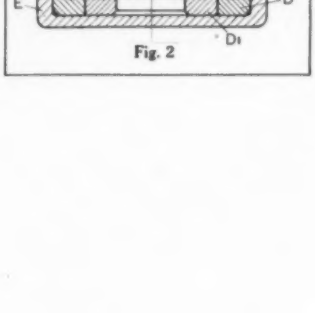


Fig. 2

## Filter, Oil, Magnetic

*Simms Motor Units, Ltd., Gresse St., London, W., England.* (Vol.76,p.202E.) 9.

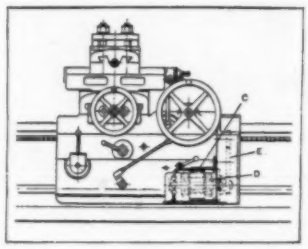
The form of this magnetic filter shown embodies four chrome-cobalt permanent magnets arranged in a plug, the space between the magnets

forming magnetic fields that attract and retain ferrous material. The filter may be cleaned by a high-pressure water jet. No remagnetizing is necessary.

## Motor Units, Built-In

*British Thomson-Houston Co., Ltd., Rugby, England.* (Vol.76,p.350E.) 55.

Built-in motor units permit the design of the housings to be in keeping with the rest of the machine and in the exact position to insure most efficient operation. Furthermore, the rotor is mounted upon any convenient spindle at any angle desired.

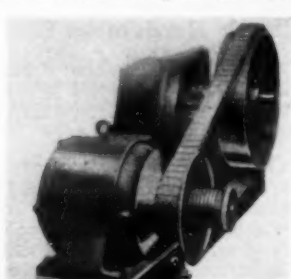



Such a motor unit has been built into a 20-in. Craven high-speed lathe, each saddle having a 1½ hp., four-pole induction motor. The stator is built up within the apron casting, and the rotor D has an extended shaft to afford drive.

## Pulley Drive, Motorized, Variable-Speed

*Crofts (Engineers), Ltd., Bradford, England.* (Vol.76,p. 214E.) 15.

An expanding pulley with special V-belt is used and may be placed either on the driver or driven shaft. The motor is mounted on a special base. Speed variation is obtained by the inward or outward movement of the motor, this movement automatically increasing or

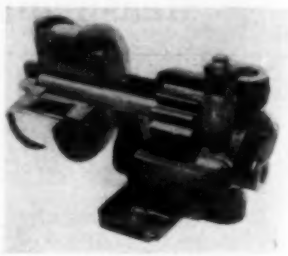


decreasing the effective diameter of the variable-speed pulley. Drives up to 10 hp. are built with ratios up to 3 to 1.

## Pump, Coolant

*Modern Machine Tools, Ltd., Butts Works, Coventry, England.* (Vol.76,p.191E.) 2.

Three sizes of the Weston gear pump are built, namely, ⅜ in. gas, ½ in. gas and ¾ in. gas delivery, the smallest being for capstan lathes up to 8 in. centers while the largest will feed

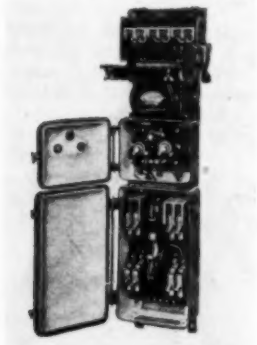


a battery of six machines. The siphon system acts as a self-priming device. A relief valve is fitted. Lift is 25 ft. The pulley bearing is long and the spindle is relieved of belt tension.

## Starter, Across-the-Line

*General Electric Co., Ltd., Kingsway, London, W.C., England.* (Vol.76,p.526E.) 88.

These small contactor starters will start 2- and 3-phase squirrel-cage motors by connecting them direct to the supply by the pressure of a pushbutton. They are suitable for motors ranging from ½ to 30 hp. at voltages up to 550, and are available in non-



reversing and reversing types. Arcing is eliminated by molded arc chutes. Pushbuttons for start, stop and reverse are inclosed in a separate cast-iron box, together with three time-limit overload relays.